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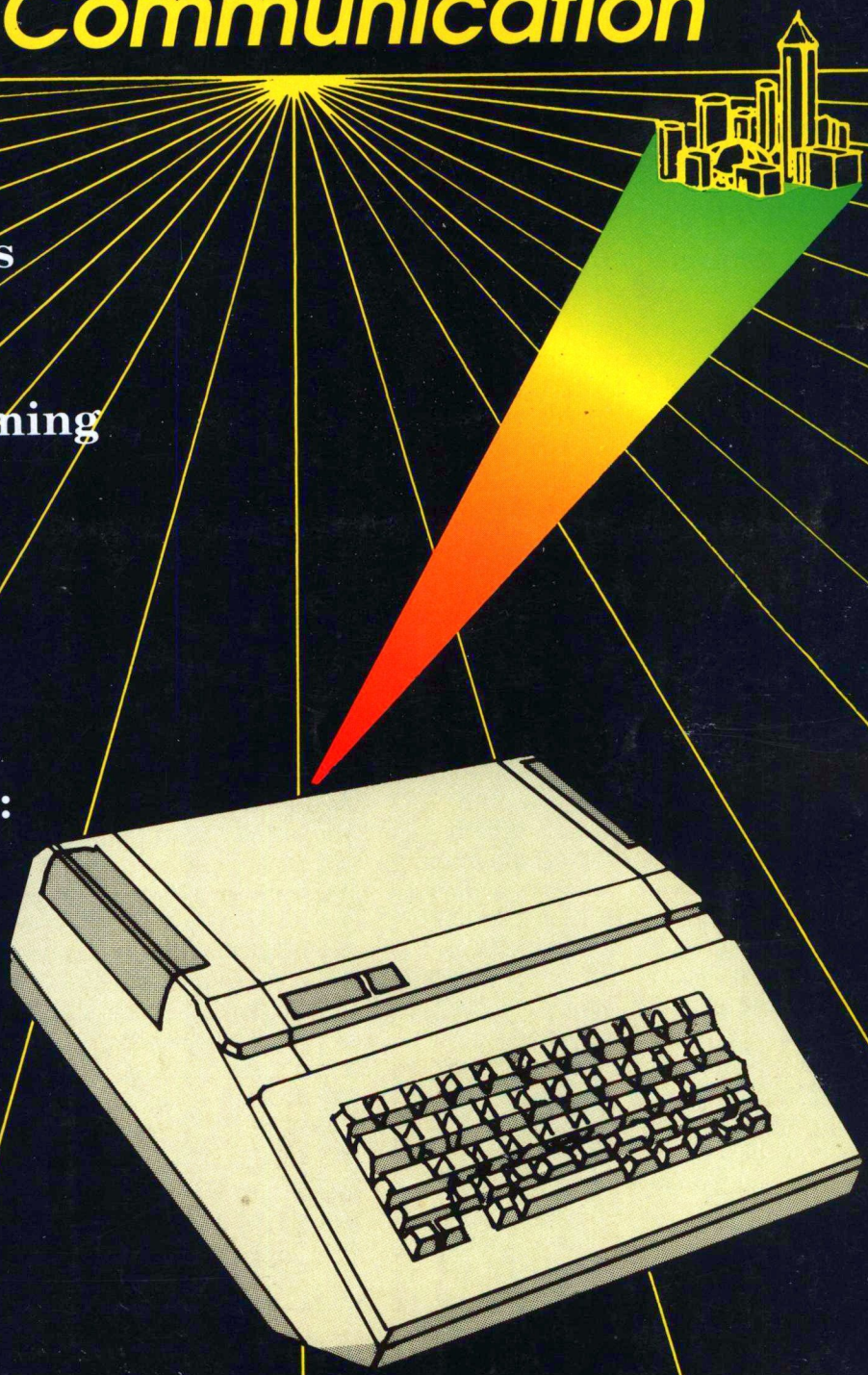
World's Largest Apple User Group Magazine

January 1987 • $3.00 U.S.

II Way Communication

INSIDE:

- Telecommunications Software Review
- Modular Assembly Language Programming
- Using EDASM
- Silicon Intelligence: *Smalltalk-80*
- IIGS Conference: *The 2nd day*
- Computing Insights: *Dr. Alan Kay*
- Write -A.P.P.L.E.
- A.P.P.L.E. Doctor
- New Products *and more!*



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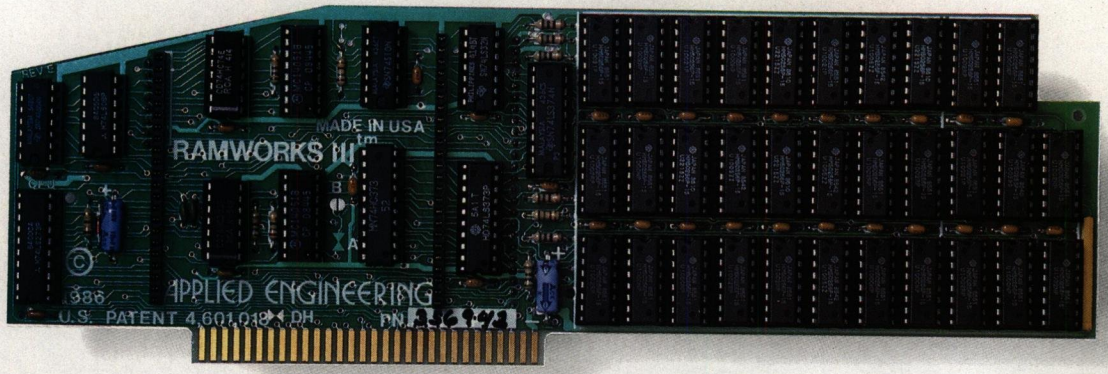
Apple PugetSound Program Library Exchange

RamWorks® III

Patented Performance from the Recognized Leader



With battery backed RAM port, RGB port, increased memory capacity, full software compatibility and more compact design, RamWorks III is a generation ahead.

RamWorks III is the newest 3rd generation RAM card for the Apple IIe. It incorporates all of the technology and improvements that years of experience and over a hundred thousand sales have given us. By selling more memory cards than anyone else and listening to our customers, we were able to design a memory card that has the ultimate in performance, quality, compatibility and ease of use. A design so advanced it's patented. We call it RamWorks III, you'll call it awesome!

The AppleWorks Amplifier.

While RamWorks III is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks III does. Naturally, you'd expect RamWorks III to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K, and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks III does. With a 256K or larger RamWorks III, *all* of AppleWorks (including printer routines) will automatically load itself into RAM dramatically increasing speed by eliminating the time required to access the program disk drive. Switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

Only RamWorks eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 25,000. *Only* RamWorks increases the number of lines permitted in the word processing mode from 2,250 to over 15,000. And *only* RamWorks offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. RamWorks even expands the clipboard. And auto segments large files so they can be saved on two or more disks. You can even have Pinpoint or MacroWorks and your favorite spelling checker in RAM for instant response.

RamWorks, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks III couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, Pro-Filer, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks is even compatible with software written for Apple cards. But unlike other cards, RamWorks plugs into the IIe auxiliary slot providing our super sharp 80 column text (U.S. Patent #4601081) in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

RamWorks III is compatible with all Apple IIe's, enhanced, unenhanced, American or European versions.

Highest Memory Expansion.

Applied Engineering has always offered the largest memory for the IIe and RamWorks III continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more than 1 MEG, RamWorks III has the widest selection of expander cards available. Additional 512K, 2 MEG, or 16 MEG cards just snap directly onto RamWorks III by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for up to 20 years.

It Even Corrects Mistakes.

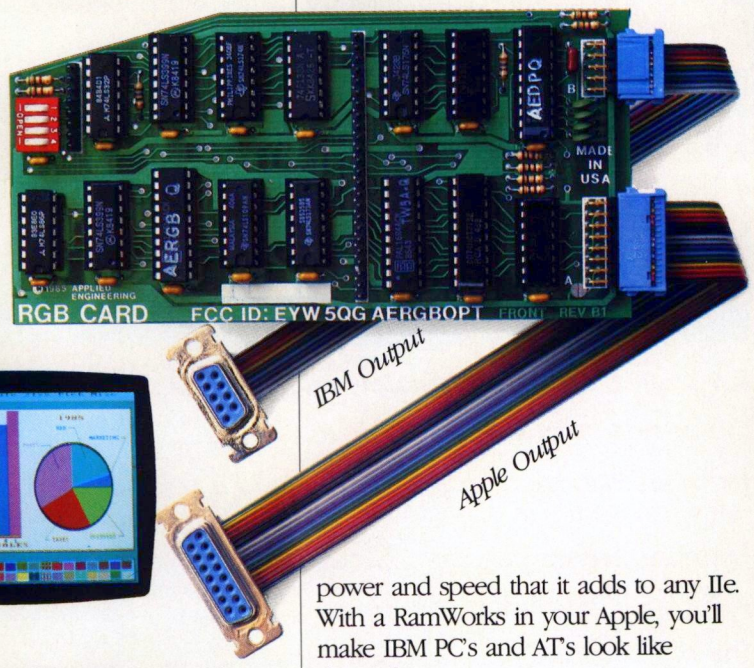
If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks III, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks and with good reason. Some others combine RGB color output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB

Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only $129 it can be added to RamWorks giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks RGB option is more than just the ultimate in color output because unlike others, it's fully compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks with no slot 1 interference and remember you can order the RGB option with your RamWorks or add it on at a later date.

RGB Option

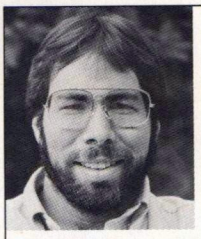


True 65C816 16 Bit Power.

RamWorks III has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

Endorsed by the Experts.

A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks is king of the hill."



"I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks."

Steve Wozniak, the creator of Apple Computer

Apple experts everywhere are impressed by RamWorks's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks in your Apple, you'll make IBM PC's and AT's look like slowpokes.

Quality and Support of the Industry Leader

RamWorks III is from Applied Engineering, the largest, most well supported manufacturer of Apple peripherals and the inventor of large RAM cards for the Apple. With our 5 year no hassle warranty and outstanding technical support, you're assured of the most trouble free product you can buy.

It's Got It All

- 15 day money back guarantee
- 5 year hassle free warranty
- Built-in super sharp 80 column display, (U.S. Patent #4601081)
- Expandable to 1 MEG on main card
- Expandable to 16 meg with expander cards, with NO slot 1 interference
- Can use 64K or 256K RAMs
- Powerful linear addressing 16 bit coprocessor port
- Automatic AppleWorks expansion up to 3017K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all IIe software
- RamDrive™ the ultimate disk emulation software included free
- Memory is easily partitioned allowing many programs in memory at once
- Compatible, RGB option featuring ultra high resolution color graphics and multiple text colors, with cables for both Apple and IBM type monitors
- Built-in self diagnostics software
- Lowest power consumption (U.S. Patent #4601081)
- Takes only one slot (auxiliary) even when fully expanded
- Socketed and user upgradeable
- Software industry standard
- Advanced Computer Aided Design
- Used by Apple Computer, Steve Wozniak and virtually all software companies
- Displays date and time on the AppleWorks screen with any PRO-DOS compatible clock
- Much, much more!

RamWorks III with 64K	**$179**
RamWorks III with 256K	**$219**
RamWorks III with 512K	**$269**
RamWorks III with 1 MEG	**$369**
RamWorks III with 1.5 MEG	**$539**
RamWorks III with 2 to 16 MEG	**CALL**
65C816 16 Bit Card	**$159**
RGB Option	**$129**
Optional Software:	
Pinpoint with RAM Enhancement Software	**$79**
VIP Professional	**$219**

RamWorks III. The industry standard for memory expansion of the Apple IIe. ORDER YOUR RamWorks III TODAY. See your dealer or call (214) 241-6060, 9 a.m. to 11 p.m., 7 days, or send check or money order to Applied Engineering.

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Volume 10, Number 1 January 1987

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Features

Telecommunications Software Review • Cecil Fretwell 11
A comparative review of five telecommunications packages.

Modular Assembly Language Programming Pt.1 • Bob Bishop 22
A "dazzling" lo-res program ready for revisions within your personal programs.

Using EDASM to Generate Relocatable Code • Bob Bishop 26
Instructions for loading a relocatable module using the Linking Loader.

Silicon Intelligence • Michael & Lisa Storrie-Lombardii 45
Some background on Smalltalk, the object oriented programming language.

The Apple IIGS Developer's Conference: the 2nd day • Keith Nemitz 49
Another close look at the IIgs.

Dr. Alan Kay at the Pacific Science Center • Keith Nemitz 53
Computing history and insights into the future.

Letters

A.P.P.L.E. Doctor • Bruce M. Field 56
Lots of hardware tips for the II users.

Write A.P.P.L.E. 55
Readers' Forum

Departments

A.P.P.L.E. Co-op New Products and Specials 5

the inside track • Kathryn Hallgrimson Suther 8

Member Billboard 9
Co-op news and views.

Member Services 9

A.P.P.L.E. Consultants 9

The Marketplace 57
Latest word on the newest Apple products.

Unclassifieds 66

Advertiser Index 63

A.P.P.L.E. Co-op New Products
January 1987 • Prices Expire February 15, 1987

SLOTBUSTER II
From RC Systems, Inc.
Apple II+,IIe, IIGS

THE DESIGNER HAS BEEN TOLD THAT IT COULDN'T BE DONE! OUR OWN TESTING SHOWS THAT THE SKEPTICS ARE WRONG!

Here is a multifunction card that lets you have a parallel printer, serial printer, modem port, speech synthesis, clock, and BSR control at the same time while using only one slot. This approach to multiple functions is fully compatible with the IIGS and lets you use the "phantom" slots that are lost by most multifunction cards such as the Versacard and the Business Card. With the Slotbuster II, a standard "CONTROL-I" printer command is used to change the output device at any time.

The Slotbuster II is designed to be expandable. (In its base configuration, it can't do anything!) Just choose one or more of the options, and you only have to pay for what you need. Additional options can be installed by you at any time if you decide to treat yourself later on. Check your installation with the diagnostic software supplied. Any suspect chip is highlighted on a graphic image of the card. Very low power design.

• PREFERENCES REMEMBERED: Configuration of the card is simple with a Mac-style pulldown menu system (text on II+'s). Choose printer types, data rates, time display format, speech volume, pitch and rate, and more; it is saved on the special EEROM until you want to change it again. Avoids the "DIP Switch Horrors"!

• BUFFERED OUTPUT: Comes with 8K buffering, expandable to 64K. Both printer ports, speech, and BSR functions are buffered simultaneously by the onboard processor, thus freeing the Apple processor to get on about its business. Flush the buffer at any time by pressing both Apple keys (II+ paddle buttons).

• SPEECH SYNTHESIZER OPTION: All the text-to-speech software is on the card so you don't have to worry about memory conflicts. If your program can output to a printer, it can output to the speech synthesizer without any modifications. You can even teach it to pronounce a specialized vocabulary correctly by uploading these exceptions for use by the text-to-speech software. Even send phonemes directly, as well as control pitch and inflection. Great for special effects and learning more about the science of speech. The synthesizer connects directly to the Apple speaker without disabling regular speaker functions. Get the optional Synthesizer Extender Cable with mini phone jack for connection to a higher quality external speaker.

The Synthesizer option comes with Speechworks software which causes AppleWorks to echo characters, words, punctuation (or any combination) as you key in the information. You also have the option of "printing" the entire document to the synthesizer. SpeechWorks is handy for confirming numeric data entry. Additional support for the blind includes optional SCAT software for using Echo Card compatible software.

• CLOCK OPTION: The clock option comes with software which installs simply in ProDOS for time and date stamping your files. Also included is a program which patches AppleWorks to continuously display the time on the screen.

• PRINTER PORT FIRMWARE: Both printer ports are compatible with most popular printers and software for text output and the reproduction of the screen in color or Black and white. In addition, both printer ports have firmware for HIRES and double HIRES monochrome graphics dumps (subset of Grappler command set). The most important commands of the Super Serial Card are also recognized. (At the actual hardware level, the Apple Parallel card registers are used for both parallel and serial printers.) The parallel port support the usual ready-busy handshaking; the serial port supports DTR handshaking, but not the less common XON-XOFF protocol.

• PARALLEL PRINTER PORT OPTION: Includes DB-25 back panel termination, Apple Parallel Card compatible. Also requires the parallel printer cable for connection to your printer.

• SERIAL PRINTER PORT OPTION: Includes DB-25 back panel termination. Order cable below or use any Super Serial Card compatible printer cable.

• MODEM PORT OPTION: The modem port is Super Serial Card compatible at the hardware level, and works with most communications software, such as Point-to-Point and Modem Magician. The modem port option may not work with some terminal software which make use of serial port firmware. The modem port lacks its own firmware. Interrupts, DTR handshake, and XON-XOFF protocol work with this card. Allows the Apple IIGS to continue to use some older communications software. Uses the Serial cable below, or most modem cables for use on the Super Serial Card.

• BSR PORT OPTION: The BSR port comes with the ultrasonic transducer for use with X-10 Command Consoles. (A.P.P.L.E. favors the X-10 Powerhouse instead of Slotbuster for this job.)

Slotbuster II
Price : $120.00 | Code : **H2R9SB** | Wt. : 1 Lb 6 oz. |
Speech Synthesizer Option
Price : $38.00 | Code : **H2R9SS** | Wt. : 6 oz. |
Clock Option
Price : $39.00 | Code : **H2R9CP** | Wt. : 6 oz. |
Parallel Printer Port Option
Price : $17.00 | Code : **H2R9PP** | Wt. : 4 oz. |
Serial Printer Port Option
Price : $13.00 | Code : **H2R9SP** | Wt. : 4 oz. |
Modem Port Option
Price :$24.00 | Code : **H2R9MP** | Wt. : 4 oz. |
BSR Port Option
Price : $23.00 | Code : **H2R9BP** | Wt. : 4 oz. |
Slotbuster II 32K Buffer
Price : $29.00 | Code : **H2R9B3** | Wt. : 4 oz. |
Slotbuster II 64K Buffer
Price : $57.00 | Code : **H2R9B6** | Wt. : 4 oz. |
Slotbuster II Shielded Serial Cable 9'
Price : $17.00 | Code : **H2R9SC** | Wt. : 4 oz. |
Slotbuster II Shielded Parallel Cable 9'
Price : $21.00 | Code : **H2R9PC** | Wt. : 4 oz. |
Slotbuster II Synthesizer Extender Cable
Price : $4.50 | Code : **H2R9EC** | Wt. : 4 oz. |

New Products continued on page 54

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To speed all orders, please include:

1. Your Name as it appears in our records (same as on your mailing label).
2. Member number and expiration date.
3. Complete STREET ADDRESS (**not** Box number — see explanation below).
4. Phone number to reach you by day if we have questions.
5. Payment Including:
   Handling charge if applicable
   Domestic or Foreign Shipping Charges
   Magazine Postage if applicable
   (Sorry we do not accept COD or Purchase Orders on individual memberships.)

Each item you order needs:

6. Complete product name (and version if there is more than one product of that type). Specify computer model you are using.
7. Product Code

SHIPPING ADDRESS: We normally ship products by United Parcel Service (UPS). Therefore, the shipping address on your order cannot be a post office box. You may specify a P.O. Box for orders weighing less than 8 ounces. You also may make special arrangements for shipping some items via US Mail, Air Parcel Post, or UPS Second Day Air.

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25-30 Lbs.	7.00
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40-45 Lbs.	10.00
45-50 Lbs.	11.00

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WEIGHT NOT TO EXCEED	48STATES A	HAWAII D
1 lb.	$ 3.00	$ 4.53
2 "	4.00	5.71
3 "	5.00	6.89
4 "	6.00	8.07
5 "	6.50	9.25
6 "	7.50	10.43
7 "	8.50	11.61
8 "	9.50	12.79
9 "	10.50	13.97
10 "	11.50	15.15
11 "	12.50	16.33
12 "	13.50	17.51
13 "	14.50	18.69
14 "	15.50	19.87
15 "	16.50	21.05
16 "	17.50	22.23
17 "	18.50	23.41
18 "	19.50	24.59
19 "	20.00	25.77
20 "	21.00	26.95
21 "	22.00	28.13
22 "	23.00	29.31
23 "	24.00	30.49
24 "	25.00	31.67
25 "	26.00	32.85

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0-4 oz.	$ 1.51	$ 1.96	$ 2.41
4-8 oz.	2.13	3.95	3.95
8-12 oz.	2.75	4.12	5.49
12-16	3.37	5.20	7.03
16-20 oz.	3.99	6.28	8.57
20-24 oz.	4.61	7.36	10.11
24-32 oz.	5.85	9.52	13.19
2-3 lbs.	8.29	13.84	19.39
3-4 lbs.	10.73	18.16	25.59
Each additional ½ lb. over 4 pounds add:	1.22	2.16	3.10

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For weights over 4lbs: $6.08 + $1.08 additional per pound.

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Quality Products You Can Depend On

INTRODUCING THE NEW MACH IV JOYSTICK

It saves you Time, Space and Money

CH Products new MACH IV JOYSTICK is **two controllers in one**. A high-precision ***mouse*** replacement and **joystick combined**. This means you can use it with any program that requires a mouse or with any program that requires a joystick.

The **MACH IV saves you time** because it is faster and easier to use than a mouse. It also doesn't require cleaning every 10 hours like most mechanical mice.

The **MACH IV saves you space** because it doesn't require any desk space or special surfaces to operate. You can even use it on your lap.

The **MACH IV saves you money** because it costs less and provides a longer life expectancy than a common mouse. And with the flip of a switch you have the added advantage of a joystick control for use with your favorite game or simulation program.

It **works better** and is compatible with **more software** than any other pointing device available today. Try it yourself and we're sure you will agree that the MACH IV JOYSTICK is the **best cursor control available today**.

Available for the Apple IIE/IIC, Macintosh, IBM PC/XT/AT and compatibles.

Suggested Retail:

MACH IV	Apple IIE/IIC (Apple IIE computer requires an Apple mouse card.)	$ 89.95
MACH IV	Macintosh (works as a mouse only)	$ 89.95
MACH IV	for IBM PC/XT/AT and compatibles	$119.95
MACH IV	for IBM PC/XT/AT and compatibles with Designer Pop-up™ Menus	$139.95

MACH II and MACH III Joysticks

are the **number 1** choice of retailers and consumers today. They provide **more features, longer life cycles** and **greater precision** than all others. With compatibility across a wider range of programs — from games to business to graphics to cad applications. With high quality metal connectors now standard on all models, they are plug in compatible with the Apple II, IIE/IIC, IBM PC/XT/AT, IBM PCjr and most compatibles.

Suggested Retail: MACH II — $44.95; MACH III — $54.95

PADDLESTICKS

are a new and unique paddle control design that promises to bring the fun and excitement back to paddle-type games. They are **faster, easier to operate** and are **less fatiguing** than conventional-type paddles. The PADDLESTICKS operate as a single-axis joystick and are currently plug-in compatible with the Apple II and IIE/IIC computers.

Suggested Retail: $24.95 (Pair)

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the inside track

Kathryn Hallgrimson Suther

in the lead:

Communication has changed through the years. The Greeks were known for their runners, who hand delivered important messages. Our native Indians used smoke signals, Africans used drums, and then... Alexander Graham Bell invented the telephone. Today we use computers and telecommunication packages to send words and graphics across the wires.

Although this subject has been covered in *Call -A.P.P.L. E.* before, things have changed considerably with the passage of time. Cecil Fretwell's **Telecommunications Software Review** examines five products: COMMWORKS, Modem Magician 5.13, MouseTalk, Point-to-Point, and PROCOM-A. Rather than reviewing each product separately, he examines all of them in a comparative manner. Topics such as hardware support, configuration of the modem and printer interface, HELP features, automatic macros, modes of operation, text, line, and screen editors are all discussed. You'll find this review of interest no matter what version of the Apple II you own.

and... close behind:

Bob Bishop, in his article subtitled **A "Dazzling" Start,** helps us to create a lo-res module which you can use within your own programs. Bob also wrote a separate article, **Using EDASM To Generate Relocatable Code**, for those of us unfamiliar with the concepts of relocatable code and subroutine libraries.

Keith Nemitz is back with a report on the second day of **The IIGS Developer's Conference.** Among other things he discusses the memory map in the GS, the control panel and the necessity of using the entry points.

Keith also contribues a short recap of our meeting with **Dr. Alan Kay at the Pacific Science Center** on November 18. Alan Kay is an Apple Fellow, one of three select scientists who have independent charters to pursue unusual ideas for Apple's future. He had a substantial influence in the development of Smalltalk, the high-level object oriented programming language. He also created the Alto computer which was the forerunner to the Macintosh. It was a meeting to remember.

This topic leads right into another feature worth mentioning, **Silicon Intelligence: Smalltalk Part 1** by Michael and Lisa Storrie-Lombardi. The Lombardi's give us some background on Smalltalk-80, a version of the original language which can be used by the Macintosh.

So, in a sense there is a lot of communicating going on in this issue. The modes of travel and the languages used vary, but each idea, package, and language is of value.

new article rating system:

In the past , we have asked our readers to rank the articles on the Readers Choice Card. We have decided that rating each article on its own merit as opposed to a comparative ranking would be more statistically valid. Please rate each article by circling the appropriate numbers on the Reader Service Card. Maybe we'll draw your card at one of our meetings and you'll receive $100 credit towards A.P.P.L.E. Co-op products.

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January 1987

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Our new catalog should be sent to you around the first of this year. It will contain our latest products for the Apple II, Macintosh, Amiga and MS-DOS compatible computers. We also want to remind you of the questionnaire that will be included with the catalog. The purpose of the questionnaire is to determine whether or not we should publish a catalog of products for all the computer systems we support or should we publish separate catalogs for these systems. Please, take the time to fill it out and send it back to us.This kind of feed back will help us determine how we might better serve you.

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Goodies from APDA

The first beta version of the Apple IIGS development system is now available. It is called Apple IIGS Programmer's Workshop (APW). Included is a command shell, full-screen text editor, linker, utilities, 65816 assembler, plus macro interfaces to the Apple IIGS Toolkit. Also available is the Apple IIGS Toolbox Reference, Vol 1 & 2. For those of us with Macintoshes, there is Macpassport v.1.0 a1. This is a generic "shell" for doing file conversions. MacPassport allows you to read/write ProDOS 3.5 disks on your Mac.

We have a Winner

Congratulations to John S. Jordan of National City, CA for winning the Reader's Choice drawing at our December 16th meeting. John will receive $100 credit towards the purchase of any A.P.P.L.E. product.

Welcome Aboard

We welcome Rich Knapton to our Co-op staff. Rich is our new Marketing Manager. He has five years marketing experience, plus an MBA in Marketing from the University of Puget Sound. His background is in research, analysis, product development and direct marketing. Welcome aboard Rich.

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Call -A.P.P.L.E. consultants are unpaid volunteers and perform a valuable service. Before placing a call, please make sure you know the time zone you are calling. No calls after 9pm please. Sometimes a consultant will have you leave your name and number and later return your calls. In all fairness, please expect the return call to be collect. We are always looking for more consultants. If you see an area that needs coverage, please drop us a note c/o *Charlie Stillman* with your qualifications and availability. The codes to the right of the phone numbers refer to time zones:

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APDA AD #2

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APDA now has the new, 1.0 version of MPW, the Macintosh Programmer's Workshop from Apple Computer, Inc. MPW is a complete development environment for the Macintosh—*the* environment Apple is using for its own work. This $100 product Includes a combined editor and command interpreter, assembler, linker, debugger, ROM interfaces, resource editor, resource compiler/ decompiler, a wide range of utility programs, and over 700 pages of documentation. Translation utilities are provided to convert MDS and Lisa assembler source.

V.1.0 MPW-Pascal and MPW-C languages are also available at $75 each. Object modules created by the compilers are link-level compatible with each other, and with the MPW assembler. Both are native-mode compilers that require MPW. One Mb of RAM is needed for the C, and 512K for the Assembler and Pascal, and all need at least 1.6Mb of disk storage. The Pascal provides object-oriented extensions that work with Apple's MacApp™ system.

Version 1.0 of these products replaces the 1.0B2 beta versions previously available from APDA. **These products are for sale to APDA members only.**

ABOUT APDA

The Apple Programmer's and Developer's Association is a one-stop source for the Apple programmer, providing development tools and technical information from Apple Computer, Inc., and other publishers; for example:

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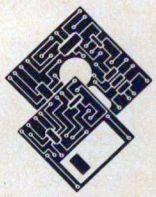

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Telecommunications Software Review

Cecil Fretwell

Telecommunications is not a new subject. A way of defining telecommunications would be "communicating over long distances." The Indians in a sense telecommunicated information using smoke signals, while their jungle counterparts used drums to relay their messages. Those of us who work with personal computers have become the modern day natives and need to have the ability to communicate between computers.

This article will concentrate on the software aspect of the telecommunications process by reviewing several packages. In this process, I have made every attempt to avoid being biased toward a particular package. You will notice I introduce the packages in alphabetical order and have not given the current price for each package. What it all boils down to is I have tried to report the facts and let you decide, based on your needs, and the merit of the product.

At the outset, it must be understood that to provide all the minute details for each package would make the article unreasonably long. Even though I worked with each package in reasonable detail, using both an enhanced IIe and the IIGS, there is always the possibility I omitted a feature. If this is true, I hope I did not miss a major feature and ask the authors of the software to forgive me.

First let me introduce the packages chosen by *Call -A.P.P.L.E.* They are:

1. **CW**—COMMWORKS authored by Shawn G. Quick and distributed by PBI Software, Inc. 1111 Triton Drive, Suite 201, Foster City, CA 94404 (415) 349-8765.
2. **MM**—Modem Magician authored by Gary B. Little and distributed by A.P.P.L.E.Co-op, 290 S. W. 43rd Street, Renton, WA 98055 (206) 251-5222.
3. **MT**—MouseTalk authored by Mark Robbins and Bill Blue and distributed by United Software Industries, 8399 Topanga Canyon Blvd, Suite 200, Canoga Park, CA 91304 (818) 887-5800.
4. **PTP**—Point-to-Point authored by Gary B. Little and distributed by Pinpoint Publishing, 5901 Christie Ave., Emeryville CA 94608 (415) 654-3050.
5. **PC**—PROCOM-A authored by Timothy Dygert and Robert Kniskern and distributed by Prometheus Products, Inc., 4545 Cushing Parkway, Fremont, CA 94538 (415) 490-2370.

Hardware Supported

Each package is given a two or three character abbreviation which is used in the tables presented in this article.

All of the packages are shipped with the ProDOS operating system. Modem Magician is the only package which is also shipped with a DOS 3.3 version on a separate disk. Only the ProDOS version of Modem Magician will be reviewed here.

To start off the process, the hardware supported by each package varies. If you have existing hardware, you need to know early on whether a package will support it. Therefore, the discussion begins with hardware configurations followed by a summary of the various major features.

Only two of the packages support the mouse. MouseTalk uses the standard pull down menu concept with clicking, dragging, etc. Besides the menu control, many functions can also be invoked using the Open Apple key and another key. There is also an imitation mouse mode in case you don't like a mouse or your mouse breaks. PROCOM uses the

mouse in a limited mode, only being able to move a menu bar and then select the desired option by clicking the mouse.

Based on information given in the manuals, the following table shows what computers are supported by a package.

	CW	MM	MT	PTP	PC
II+	.	X	.	.	X
IIe	X	X	X	X	X
IIc	X	X	X	X	X
IIGS	X	X	X	X	

The Extended Apple 80 column text card is required with COMMWORKS, MouseTalk, and Point-to-Point. Because it uses the mouse and the associated special symbols, MouseTalk requires an enhanced IIe. Prometheus claims that in the near future, PROCOM will be modified to work with the IIGS.

Hardware for the various packages is best given by means of tables. If your hardware is not in a table and you still like the software, contact the vendor for further information.

A Modem Point of View

From a modem point of view, see Table 1 for internal modems. For external modems using an RS232C serial interface, Table 2 describes the serial interface cards supported.

The COMMWORKS manual offers no clues as to what constitutes an "Other Interface". For MouseTalk, the Generic 6850 Serial Card refers to a card using a 6850 UART chip. More details on how to identify a UART are given later in this review.

There are also the intelligent modems or special modems as summarized in Table 3, and connected to one of the serial interface cards given in the previous table. The No Smart Modem option in MouseTalk by their definition is a modem which is not Hayes compatible and is not on the list. Being Hayes compatible is a key factor for most telecommunications packages.

For the printer interface cards see Table 4. The COMMWORKS column appears to be incomplete. I was only successful in making the printer work on the IIGS. The idea of a Firmware Printer Driver may be clearer when the configuration process for Point-to-Point is discussed. I have a feeling it refers to most of the cards given in this list.

TABLE 1

	CW	MM	MT	PTP	PC
Hayes Micromodem II or IIe	X	X	X	X	X
Novation Apple Cat (300 baud)	X	X	X	X	X
SSM Apple Modem Card	.	X	.	X	.
Prometheus ProModem 1200A	.	X	X	X	X
Multitech Multimodem	.	X	X	X	.
Cermetek AppleMate 1200	.	.	X	X	.
Zoom Telephonics ZOOM/Modem IIe	.	.	.	X	.
Microcom Era 2	.	.	.	X	.
Transend AMC300	.	.	.	.	X

TABLE 2

	CW	MM	MT	PTP	PC
Apple Super Serial Card	X	X	X	X	X
AST Multi I/O Card	X	X	.	X	.
Apple IIGS Serial Port	X	X	X	X	.
Other Interface	X	.	.	.	.
Prometheus VersaCard	.	X	X	X	X
CCS Model 7710A	.	X	X	X	.
CCS Model 7711	.	.	X	X	.
Videx PSIO Card	.	X	X	X	X
SSM ASIO AppleSerial I/O	.	X	X	X	.
Advance Logic Systems Dispatcher	.	X	X	X	.
Apple Communications Card	.	X	X	X	.
SSM AIO Card	.	X	X	X	.
Macrotech Macrocomm Serial I/OCard	.	X	.	X	.
Street Electronics Business Card	.	.	X	X	.
Business Card Serial Driver	.	.	X	.	.
Generic 6850 Serial Card	.	.	X	.	.
Quadram Serial Interface Adapter	.	.	X	X	.
Quadram Multicore	.	.	.	X	.
Transend AIO	.	.	X	.	X
Transend ASIO	.	.	X	.	X
Transend AIO-II	.	.	X	.	X

For Modem Magician, an 80 column video display mode can be selected if an Apple IIc, an Apple IIe with 80-column Text Card installed, or an Apple II with a Videx Videoterm (Soft Video Switch version), Videx Ultraterm, or Applied Engineering Viewmaster installed, is being used.

In my experience with a variety of personal computers, once you find software to support the hardware, a large majority of the battle has been won. From here on, the software you choose is a matter of personal choice.

Except for PROCOM which comes with two disks, all packages come with one floppy disk. None of these are copy protected, therefore, it is strongly recommended you make a copy of the disks and work with the copy. All the packages involve tailoring the software to support the hardware, the result of which is stored in some module on the disk. Such a module might be an existing file on the disk. All of the packages assume a default configuration so don't be surprised if a "warmup" or "familiarize yourself" tutorial given in the manual does not work until you configure your system.

Once you configure the system on the floppy disk, those of you without hard disks can proceed accordingly. For those who have a UniDisk, or are blessed with hard disks, what to copy from the floppy to hard disk may not be obvious from the manual. If you have problems, either contact the vendor's technical support staff or seek the help of an expert.

Some of the packages force you into a configuration mode the first time you boot the floppy or activate the package

TABLE 3

	CW	MM	MT	PTP	PC
Apple Modem 300 or 1200	X	X	X	X	X
Hayes Smartmodem 300 0r 1200	X	X	X	X	X
U.S. Robotics Password	.	X	X	X	.
Universal Data Systems 212A/D	.	X	X	X	.
Anchor Automation Signalman MarkXII	.	X	X	X	.
Prometheus ProModem	.	X	X	X	X
Hayes SmartModem 2400	.	.	X	.	.
Apple Personal Modem	.	.	X	X	.
Multi-Tech MT21HC and MT224	.	.	X	.	.
Novation Smart Cat Plus	.	.	X	.	.
Prentice Popcom X100	.	.	X	.	.
Racal Vadic Maxwell 1200V and 2400V	.	.	X	.	.
USR 212A or Courier 2400	.	.	X	.	.
No Smart Modem	.	.	X	.	.
Direct connect (No Modem)	.	.	X	.	.
U.S. Robotics Courier Modem	.	.	X	X	.
CTS Intelligent	.	.	X	.	X
Transmodem 1200	.	.	.	.	X

TABLE 4

	CW	MM	MT	PTP	PC
Apple IIGS Serial Port	X	X	X	X	.
Apple Parallel Interface	.	X	X	X	X
Apple Communications Interface	.	X	X	X	X
CCS Model 7710A	.	X	X	X	X
PKASO Parallel Interface	.	X	X	X	X
Grappler or Grappler+	.	X	X	X	X
Prometheus VersaCard	.	X	.	X	X
Prometheus Graphitti	.	X	.	X	X
Apple Super Serial	.	X	X	X	X
Videx PSIO	.	X	X	X	X
SSM AIO	.	X	.	X	X
Firmware Printer Driver	.	.	X	.	.
SSM ASIO	.	.	.	X	X
Videx UniPrint Parallel Printer	.	.	X	X	.
Apple High Speed Serial	.	.	.	.	X
Apple Silentype	.	.	.	.	X
Epson Parallel	.	.	X	.	X
Tymac Parallel	.	.	X	.	X
Transend APPIC Parallel	.	.	.	.	X
Transend AIO, AIO-II, and ASIO	.	.	.	.	X

for the first time from a UniDisk or a hard disk. Such is the case for Point-to-Point. Modem Magician will do this if it cannot find a file called MM.-CONFIG. MouseTalk goes one step further and gives you the option of formatting a disk, copying the Mouse-Talk files, then proceeding to specify your hardware.

Menu Driven

All the systems reviewed are menu driven. For those of you who like AppleWorks, COMMWORKS and Point-to-Point use the file card concept with a Main Menu card and other cards resulting from selecting a menu item. PROCOM uses a 40 column screen with a mixture of file cards and prompt lines. Modem Magician also uses a 40 column screen without the file card concept, however, it retains the menu bar concept. As stated earlier, Mouse-Talk is best used with a mouse in what one might call full mouse mode.

If you have a limited technical knowledge of telecommunications, the configuration process may appear to be a bit heavy beyond specifying a slot number. COMMWORKS has about the simplest hardware configuration process using an Other Activities file card with an option to "Specify information about your system". One selects a modem by name, an interface by name, and no choice with regard to a printer interface.

MouseTalk is also simple. A list of some possible devices is given, you choose the appropriate device.

PROCOM is less restrictive in its selection process. A couple of key strokes from Main Menu gets you to a DEFINE YOUR HARDWARE file card. By means of menu bars and arrow keys, one can select a modem card, external modem, and printer card by name. This same screen provides for the screen card, e.g., IIe 80 Column Card (used only when on line with another computer), printer information such as data format, slot, mouse on or off, etc.

Modem Magician and Point-to-Point can both be a bit technical when it comes to choosing a modem interface and a printer interface. If you have a Micromodem, Modemcard, Applecat or Commcard, the configuration is easy, you select a corresponding item. If you don't have one of these interfaces, you have choices such as Standard 6551, etc. which refer to the UART chip used on the interface card. If the manual for your interface card does not indicate the type of UART used, examine the card for a large chip containing the indicated number, or contact the vendor technical support for further assistance. Choosing a printer interface is not quite so bad with special choices for the Grappler and PKASO cards. The other choices are standard firmware, standard parallel, or standard serial.

A brief point about UARTs if you purchase a package to use on your IIGS and the IIGS interfaces are not listed. Look for a reference to the 8530 because this is what is used in the IIGS. Such is the case for Modem Magician and Point-to-Point.

Becoming comfortable with any software can take some time. To alleviate some of the pain, some packages offer HELP capabilities. COMM-WORKS provides this via the Open Apple-? AppleWorks standard. Modem Magician and Point-to-Point provide limited help only in the editor or when

on-line with the host. MouseTalk shows a HELP box to aid in selecting the desired help. PROCOM has HELP only with certain screens.

Just because a HELP feature is limited or does not exist, don't reject any software package for this reason alone. HELP files tend to chew up a lot of disk space and, especially true with floppy disk based systems, requesting HELP can take some time.

Establish Communications

Once a package is configured, the next logical choice is to test the results by connecting to another personal computer or to a bulletin board system such as DELPHI or COMPUSERVE. Such a process is called "Establish Communications".

Each package has its own method of eventually reaching the condition of being able to talk to the other computer via the keyboard and have it talk back on the screen. Fortunately all the packages are user friendly enough to make it possible for a reasonably knowledgeable first time user to establish the right kind of conditions without referring to the manual or using a HELP facility.

Universally, each package has a "telephone directory", stored on disk, which goes beyond the normal phone number. Associated with a phone number are several parameters which control or influence the flow of information between the two computers. The major items contained in each package's telephone directory are summarized in Table 5.

There are other minor items which could be added to this list, however, only the more important ones are discussed here.

Some other explanations with regard to Table 5 are in order. Traditionally, the XOFF character (Hex 13) is sent to a remote computer to tell it to stop sending data. The XON character (Hex 11) tells the remote computer to continue sending data.

Providing a prefix to a phone number allows one to precede the phone number with the various Hayes commands such as mute the speaker on the modem, pulse dial the number, etc.

Automatic Macros

Keyboard macros provide the ability to associate several keystrokes with one or more keystrokes from the keyboard. For example, Point-to-Point uses the Closed Apple key and a user defined key to invoke a specified string of characters. Each package has a special editor for creating, modifying, etc. macros. Beyond what is to follow in the automatic macro discussion, I feel macros is a subject better regarded as a graduate course after one masters the knowledge briefly summarized in this review.

This leads to the topic I refer to as automatic macros. COMMWORKS, Modem Magician, and PROCOM use the standard simple approach involving what are known as trigger characters. By way of example, if the host ends its user identification prompt with a question mark (?), these packages can be set up to wait for this character then respond automatically with a string of characters representing the user identification. This can then be further expanded to wait for something like the password prompt ending character, send the password, etc.

TABLE 5

	CW	MM	MT	PTP	PC
Baud rate	X	X	X	X	X
Data format	X	X	X	X	X
XON/XOFF enable/disable	X	.	X	.	X
Half or full duplex	X	X	X	X	X
Phone number	X	X	X	X	X
Prefix to phone number	X	X	X	X	X
Keyboard macros	X	X	X	X	X
Automatic macros	X	X	X	X	X
Variable terminal type	X	.	X	.	.
Variable file type xfer	X	.	X	.	.
Ignore line feed	X	X	X	X	.
Send line feed with return	X	X	X	X	X
Capture buffer storage type	X	.	.	.	.
Delay after each line	.	X	X	X	X

TABLE 6

	CW	MM	MT	PTP	PC
Status line	X	X		X	x
Memory capture buffer size	35K	11K	36K	17K	47K
Disk capture	X	X	X	X	X
Load capture buffer	X	x	X	x	x
Save capture buffer	X	x	X	X	x
Start capture buffer	X		X	X	X
Stop capture buffer	X	X	X	X	X
View capture buffer	X	x	X	x	x
Print capture buffer	X	x	X	x	x
Copy screen to capture buffer	.	.	X	X	.
Transmit capture buffer	X	X	X	X	x
Clear capture buffer	X	X	X	X	x
Multiple capture buffers	X	.	.	.	.
Break key	X	X	X	X	X
Hang up phone	X	X	X	X	X
XMODEM file transfer	X	X	X	X	X
PRODOS file transfer	X	.	X	X	.
Screen hard copy	X	.	X	X	.
Printer echo during host	.	X	X	X	X
Key click on/off	X	.	X	.	.
Complete disk send/receive	x	.	.	.	x
Strip control characters	x	x	X	x	.
Change file type	x	x	-	x	x

MouseTalk and Point-to-Point expand this trigger concept further. They can be told to wait for a string of characters and then respond with a string of characters. There is also the ability to perform alternate actions when an error occurs, wait a certain period of time, etc. MouseTalk provides for a special macro labeled "Log-in". After a telephone connection is made to the remote computer, this macro can be used to automate the software procedure for gaining access to the computer. Point-to-Point provides this same capability by automatically invoking a macro if the telephone number ends in a plus (+) sign.

Modes of Operation

As referenced in Table 5, COMMWORKS and MouseTalk support a variable terminal type. In the process of specifying communications parameters, COMMWORKS has an option called "Terminal Attributes". Under this heading is TTY, VT-52, VT-100, and VT-100 (Full Screen Option). TTY dates back to the early days of time-sharing when teletype terminals were used with modems. Basically, one typed a line, hit the RETURN key, and waited for a response from the host. This traditional method of communication with a remote computer is still in heavy use today.

Reference to the VT series of terminals is associated with CRTs manufactured by Digital Equipment Corporation (DEC). COMMWORKS is designed to make an Apple Computer "look" like a VT series as far as the remote computer is concerned. Such a mode in operation is called terminal emulation.

Mousetalk greatly expands the list of terminals emulated. Its list of terminals emulated includes the ADDS Viewpoint, ADM 3A, DEC VT-52, Dow Jones, IBM 3101, Soroc IQ-120, and Televideo 912.

The ability to control the variable file type transfer is related to a future topic regarding changing a file type. As used under COMMWORKS, I uploaded to a bulletin board system a simple AppleWorks Spreadsheet, file type ASP, using the XMODEM protocol. Using a menu under COMMWORKS, I configured it to receive a file type ASP and downloaded the file. The result was a file recognized by AppleWorks.

Telling the software to ignore a line feed means ignore the first line feed from the host after a carriage return has been received. In the Apple world of software, a carriage return character not only moves the cursor to the beginning of a line, but also, moves the cursor down a line. Therefore, a line feed (down arrow) after a carriage return could create a double spaced display. On the other hand, a carriage return followed by two or more line feeds from the host is intended to create blank lines.

For the option of sending a line feed with return, to quote the Modem Magician manual, other computers insist on receiving the line feed after a carriage return if a line is to be properly terminated, e.g., when communicating with a Radio Shack Model 100.

For the capture buffer type option, in later paragraphs, some discussion will be devoted to the fact that most packages stored received files as TXT type files on disk even though a file may be, for example, an AppleWorks word processor file. COMMWORKS allows you to override this default before you store the file on disk.

The ability to delay after each line serves at least two purposes. First, a host may be slow in receiving a line and needs to "catch its breath" before it will receive another line. There are cases where if this delay is not performed, data may be lost in the process. Second, the host may again be slow, it receives the data properly but is slow in echoing the data. The result is a messy screen on the Apple side of the link..

Unique & Common Features

Once the system is in terminal mode, i.e., you have established contact with the host computer, there are features common to each package and features unique to each package. See Table 6.

Before making some specific comments about a package, let me further clarify terminal mode. At first, one associates this with typing commands to the host on the keyboard and observing the results. All packages

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reviewed here allow you to "escape" from this condition back to a menu. The connection to the host is not broken, unless your escape includes this, which means you can return to talking with the host at any time. If you "escape", the current screen is cleared, i.e., when you return to host operations, your previous screen is gone. Also, during the "escape" process, if any messages, displays, etc. come in from the host, they are lost. COMMWORKS provides one exception to this general rule, if you escape to another menu, it does not appear to lose the host screen. Point-to-Point is constantly being improved, therefore, I would not be surprised to see it include a screen save feature in the future.

MouseTalk does not really suffer from this "loss of screen" problem. This is due to the use of standard pull down menus which never destroy the contents of the screen they overlay.

I mention this not only as a warning, but also, to lay the groundwork for the use of the upper and lower case "x" characters in this table. An upper case X means the feature is available while retaining the current host screen. A lower case X means you must escape to a different menu, hence, you lose the host screen.

For the status line feature, the COMMWORKS status line includes the capture buffer status (on or off or disk), the amount of memory left in the buffer, and an alternate status line showing the current disk file name in an AppleWorks sense. Both Modem Magician and Point-to-Point include the COMMWORKS features plus a short summary of keys such as start an XMODEM file transfer. COMMWORKS makes up for this by means of AppleWorks type of Open Apple-? help screens. When PROCOM is told to switch to the host screen, it will show the status of the capture buffer and a printer buffer.

This status scrolls off the screen after sufficient incoming lines from the host. By means of a couple of keystrokes, the buffer status can be redisplayed.

A capture buffer is one which provides the ability to store characters in memory as they are received from the host computer. MouseTalk also uses the term review buffer in addition to the term capture buffer. Their concept will be covered in a separate set of paragraphs.

COMMWORKS allows a direct capture to memory or to disk, but not both at the same time. Both Modem Magician and Point-to-Point capture only to memory, however, when the memory becomes full, it is automatically dumped to disk. There is no indication what COMMWORKS does if its memory capture buffer fills up. It is possible to save the buffer to disk under a specified name. In the case of PROCOM, full memory is saved to disk only if that option is specified.

You will note COMMWORKS will allow multiple capture buffers. This is only possible if you have an extended RAM card such as Applied Engineering's RAMWorks in your system. If you are using a IIGS, the memory expansion card, if any, is not treated as extended RAM, however, it can be used as a very fast RAM disk.

All packages provide the ability to edit the capture buffer. This will be covered briefly in future paragraphs. They all allow the ability to send the buffer to the host as if the file were a text file. PROCOM has the unique ability to send the buffer using the XMODEM protocol. For the other packages, the buffer must be saved to a disk file then sent to the host using the XMODEM protocol.

MouseTalk works with both a capture buffer and a review buffer. The review buffer holds the last 8,192 characters received from the remote computer. When the review buffer gets full, the oldest characters are discarded to make room for new characters. While online with the remote computer, the entire buffer may always be viewed. With this viewing activity active, portions or all of the buffer can be copied to a clipboard, to the printer, or to a disk file. Most, if not all, the capture functions are available with the exception of not having an automatic spill to disk if the buffer gets full.

Hang Up Feature

For those of you who don't know what the break key is, it is a key on the old teletype machines. When used on the teletype, it sent a long duration special signal commonly used to make a remote modem hang up the phone.

The hang up the phone feature assumes an intelligent modem which supports the Hayes protocol. This generates the "+++" sequence followed by the "ATH" sequence to hang up the phone. By means of something like "BYE" to tell the host computer you are done, such a command does not always result in a hung up phone. Therefore, having this simple one or two key feature could save a lot of long distance charges.

For the ProDOS file transfer feature, COMMWORKS calls this ProDOS/-AppleWorks protocol and Point-to-Point calls this Extended Xmodem Protocol. Under normal XMODEM conditions, only the data in a file is transferred across the link. This feature also transfers the ProDOS file attributes. There is no indication COMMWORKS and Point-to-Point can talk to each other using this protocol.

The screen hard copy feature is the Open Apple-H type of AppleWorks command. It makes a hard copy of the screen using the printer. This is not to be confused with the printer echo during a host feature. MouseTalk's screen printing capability will only work if one is using the ImageWriter or ImageWriter II printer. If attempted with another type of printer, the results will be unpredictable.

All but COMMWORKS provides the ability to have each character coming from the host to the screen to also be echoed on the printer. This is called printer echo during host operations. This is a nice feature for one who doesn't want to bother with a capture buffer which can always be printed.

The key click option in COMMWORKS or MouseTalk comes up with the click off. It only applies while the host screen active. Turning key click on causes a clicking sound for each key pressed. PROCOM has a feature of this nature only in its editor.

The complete disk send/receive feature is definitely unique to each package. I doubt very much if COMMWORKS can send a complete disk to PROCOM or vice versa. It is an excellent concept, however, it can be hazardous to your phone bill's health. Without even considering overhead time between records, the transfer of a 5 1/4 inch disk would require 20 minutes and the transfer of a 3.5 inch disk would require 111 minutes at 1200 baud.

The ability to change file type may be an absolute must when working with bulletin boards such as DELPHI or COMPUSERVE. From a technical point of view, files are either straight text files or binary files. From the Apple side, when receiving a file, it is almost always given the TXT file type even if a binary file such as an AppleWorks file is being downloaded. If the contents of the file are binary, only XMODEM can be used in the upload/-download process. Therefore, the file may be complete in every sense of the word except for its type. For example, if the file is an AppleWorks word processor file, AppleWorks will not load the file unless it is a type AWP file. Therefore, a means is necessary to convert the "default" TXT type established at download time and change it to the AWP type.

Answer Mode

All of this business of terminal mode assumes the Apple is a terminal connecting into a host. This type of situation is called Originate Mode. All of the packages provide the ability for the Apple to be a host computer. Given a modem which can "answer" the phone when it rings, this type of situation is called Answer Mode.

Setting up a package to support Answer Mode does not change any other parameters established for Originate mode. In other words, regardless of mode, a package is set up to support the specified hardware.

COMMWORKS, Modem Magician, and Point-to-Point are plain vanilla when it comes to Answer Mode. They answer the phone after a user selectable number of rings after which the two parties can begin communicating with each other, transfer files, etc. Modem Magician adds a friendly touch by displaying something like "Welcome to Modem Magician" when it answers the phone and establishes contact. Point-to-Point extends this to allow the contents of a user modifiable TXT file called WELCOME to be sent when the phone is answered.

PROCOM does not have a greeting message capability but does have two modes of operation for Answer Mode. The first is as described above. The second is that after PROCOM answers the call from a remote computer, it can be made to either send or receive files from disk in an unattended mode.

MouseTalk has the most sophisticated answer mode of operation. In addition to the so-called standard features supported by the other packages, MouseTalk can act as a limited intelligent remote computer. After it answers the phone, it can be told to require a password before access is allowed. It can also be told to provide access only to specified subdirectories on a disk.

What it amounts to is if I establish contact with a remote MouseTalk based system and am allowed access, I have limited control of that system. By means of commands, I can:

1. Display allowed access to files.
2. Disconnect from the remote system.
3. Copy incoming text to a file.
4. Control delay at the end of each received line.

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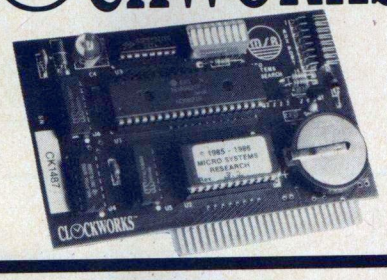

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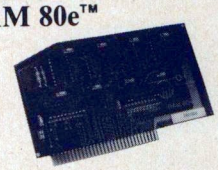

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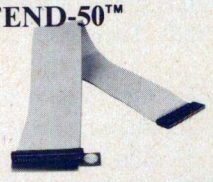

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5. Obtain on-line HELP.
6. Chat with a person at the keyboard on the remote.
7. List a catalog of files in current directory.
8. Change prefix to a directory.
9. Receive/send files using the XMODEM protocol.
10. View the contents of a file.

This Answer Mode business can be a bit irritating to ordinary people calling you, e.g., at home. Instead of a person's voice, they hear the obnoxious whistle of your modem. Or consider the very practical application of transferring files from a non Apple computer at work to an Apple computer at home. In getting the wife fully trained (even if she is pretty good with computers), you may have to call a neighbor to go next door and tell the wife to hang up the phone because of some problem in the "protocol".

The Text, Line, and Screen Editors

All of the packages have a text editor. These editors range from the use of reasonably simple commands up to a set of sophisticated commands. One very common use of the editing tool is to make last minute changes to a document before you send it to the host computer or make changes in a received document before you save it to disk. These editors are so different, it is not appropriate to take the table approach.

The COMMWORKS editor is a full screen editor which emulates the AppleWorks word processor in an extremely limited sense. It has the following features:

1. Full arrow key control.
2. Delete character to left of cursor.
3. Append file to end of current buffer.
4. Move to beginning of buffer.
5. Clear buffer.
6. Delete a line.
7. Change from insert to overstrike and vice versa.
8. Hard copy of screen image.
9. Print buffer.
10. Toggle carriage return display.
11. Move to beginning or end of a line.
12. Load/save a file from/do disk.
13. Set/clear tabs.
14. Move cursor to beginning/end of line.

TABLE 7

	CW	MM	MT	PTP	PC
Establish temporary prefix	X	X	X	.	X
Establish standard prefix	X	.	.	X	.
Display catalog offiles	X	X	X	X	X
Create a subdirectory	X	.	X	.	X
Delete a file	X	X	X	X	X
Format a disk	X	.	X	.	.
Load a file	X	X	X	X	.
Save a file	X	X	X	X	.
Rename a file	.	X	X	X	X
List volumes	.	.	X	.	X
Display/print textfile	.	.	X	.	X
Lock a file	.	.	.	.	X
Unlock a file	.	.	X	.	X

TABLE 8

	CW	MM	MT	PTP	PC
Dump screen to printer	X	.	X	X	.
Print from editor	X	.	X	.	.
Print from buffer	.	X	X	X	.
Set form size		X	.	X	X
Set page size	.	X	.	X	X
Set/clear page pause	.	X	.	X	.
Set left margin	.	X	X	X	X
Set right margin	.	.	X	.	.
Set initial page number	.	X	.	X	.
Carriage return/Line feed	.	X	X	X	X
Print disk file	.	.	X	X	X
Set top margin	.	.	.	.	X
Set text width	.	.	.	.	X
Save margin settings	.	.	X	.	X
Set data format, e.g., parity	.	.	.	.	X
Set baud rate	.	.	.	.	X

Modem Magician uses a line editor. In this editor there are four basic commands. They are:

1. Add lines to buffer.
2. Delete lines from buffer.
3. Edit lines in the buffer
4. List lines in the buffer.

Everything is based on a line number or a range of line numbers. In the process of editing a line, the following capabilities are provided:

1. Delete character under cursor.
2. Move left one position.
3. Insert/overstrike mode.
4. Delete character to left of cursor.
5. Clear to end of line.
6. Cancel edit of line without changing contents.
7. Fixed tabs.

Point-to-Point also uses a line editor. It is the same as the one for Modem Magician. It has a simple HELP screen for the four commands. It also has a status line telling how much memory is left in the buffer.

MouseTalk uses a full screen editor whose features are:

1. Delete character under cursor.
2. Full arrow key control.
3. Delete character to left of cursor.
4. Remove selected text to clipboard.
5. Copy selected text to clipboard.
6. Insert text from clipboard.
7. Copy selected text to printer.

8. Copy selected text to a disk file.
9. Find or find next text.
10. Word wrap.
11. Set margin width.
12. Change case of a sentence to all capital letters, all lower case letters, or lower case with the first letter being a capital letter.
13. Remove control characters from text.
14. Show clipboard contents.

PROCOM has a full screen editor which is very close to being a full featured editor, however, it is not difficult to use. Some major features are:

1. Tab left or right.
2. Delete character under cursor.
3. Insert space in a line.
4. Combine two lines into one line.
5. Insert/delete a line.
6. Delete to end of line.
7. Restore line.
8. Split line into two lines.
9. Block commands to move blocks of data, left justify data, center data, etc.
10. Neatness commands to left justify, right justify, center, or expand a line.
11. Go to beginning of buffer.
12. Go to end of buffer.

There are 26 different major commands started by using the CONTROL key with a letter of the alphabet. Some of the commands are further expanded by a second CONTROL key with a letter of the alphabet. For example, CTRL-Y has some twelve sub commands associated with it. Obviously, by avoiding special keys like Open Apple, PROCOM can be used on an Apple II+.

Disk Functions

The next major function to be described falls under the general heading of disk functions. Again, a table is appropriate, see Table 7.

There is one last major function to be described for the packages and involves printers. See Table 8.

In Table 8, form size refers to the number of lines on a page. Page size refers to the number of lines printed on a page. The page pause option provides for the use of single sheets of paper in a printer. For the carriage return/line feed option, some printers automatically supply a line feed after receiving a carriage return, others do not and need to be sent a carriage return.

This concludes what I hope is a comprehensive coverage of what each package has to offer. Permit me to finish up by describing a couple of additional functions offered by Modem Magician and Point-to-Point.

Some Additional Functions

The distribution disk for Modem Magician contains some extra programs called LF.STRIP, FP, ML, and PASCAL. To explain the function of the machine language program called LF.-STRIP, when downloading a text file from some bulletin board systems, that file will contain a line feed character after every carriage return character. If the file is an EXEC file to produce something like an AppleSoft BASIC program, the line feed characters create havoc in the EXEC process. LF.STRIP removes the pesky line feed characters to produce a file which can be successfully EXECed if that is the purpose of the file.

In theory, an AppleSoft BASIC program, which is really in a pseudo binary format, can be uploaded to a bulletin board system and subsequently downloaded. This absolutely requires XMODEM capability plus some other tricks to make the result LOADable. An alternate would be to have the BASIC program be stored in text form which can be EXECed to produce the desired program in memory. The program FP converts a BASIC program to a text file which can be EXECed.

Again in theory, a machine language program maybe uploaded to a host. This absolutely requires using XMODEM. This is fine for uploading purposes, however, problems occur in downloading. As mentioned earlier, the default TXT file can be changed to BIN. This leaves the problem of the load address which can be manually entered every time a file is BLOADed. The program ML converts a machine language program to a text form which can be EXECed to produce a proper BLOADable module.

A similar problem arises in the use of PASCAL programs. The program called PASCAL converts a program on a PASCAL formatted disk to a text file which can be processed accordingly on uploads to a host and downloads from a host.

Point-to-Point incorporates the LF.-STRIP program into its natural mode, i.e., it is a menu option. The programs FP, ML, and PASCAL in Modem Magician are also included in Point-to-Point. Point-to-Point also provides a menu option to convert a TXT file to an AppleWorks word processing file.

Let's finish up this lengthy review with a hardware discussion. If you are lucky to have the proper cables, cards, etc. to set up your system then you do not have to read any further. If this is not the case, either you or a friend may have to make some cables.

Do not fault the COMMWORKS manual if it does not provide cabling information. COMMWORKS is an excellent package which operates with popular hardware. For this hardware, usually a standard cable may be purchased.

The Modem Magician manual has a five page appendix devoted to the installation of peripheral devices. This appendix includes the pin assignments for a standard 25 pin connector. It provides further hints for wiring and also switch settings for some common special modems. This same information is carried over to Point-to-Point.

MouseTalk only gives some brief details regarding the Super Serial Card. Beyond this, no further wiring details are given. MouseTalk is an excellent package which operates with a wide variety of popular hardware. As is the case with COMMWORKS, usually a standard cable may be purchased.

PROCOM is naturally slanted toward the Prometheus VersaCard and the Prometheus ProModem 1200 or Prometheus ProModem 1200A. It includes some hints as to how to configure an Apple Super Serial Card. It also includes cabling information which should apply to a large majority of situations.

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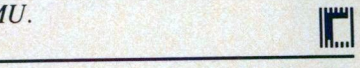

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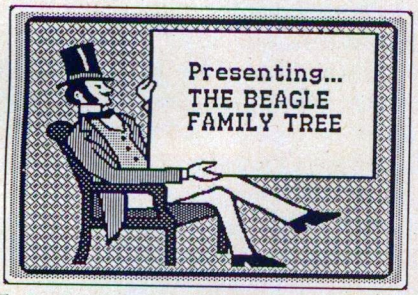

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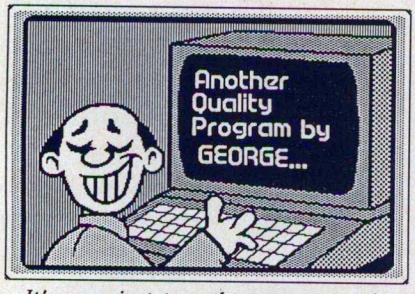

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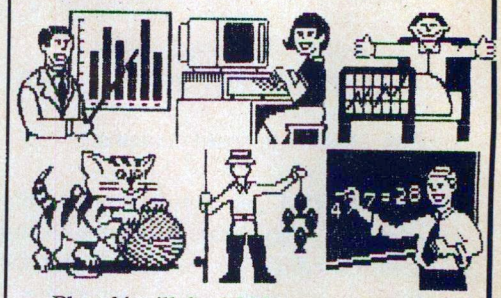

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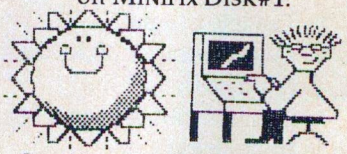

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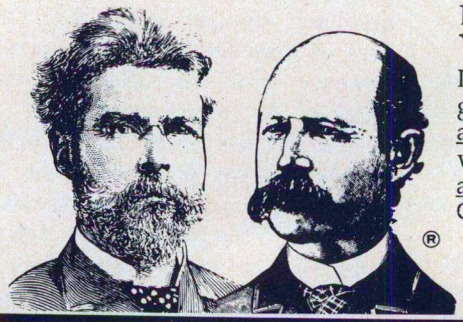

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>
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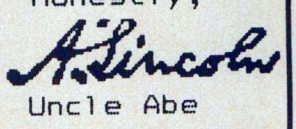

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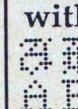

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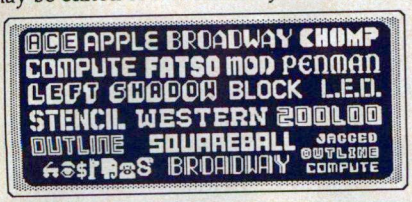

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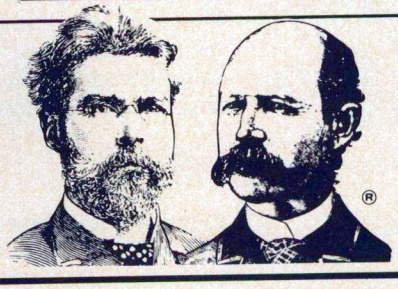

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Modular Assembly Language Programming

Part I: A "Dazzling" Start

Bob Bishop

Last month, in the article titled "Let's Start Publishing Usable Assembly Language Code", I presented a set of guidelines for writing 6502 assembly language subroutines. These guidelines were:

a. Maintain the integrity of the X and Y registers.
b. Maintain the integrity of Page Zero.
c. Avoid using absolute memory locations for passing subroutine calling parameters
d. Make your subroutines relocatable

The purpose of these guidelines was to help you write subroutines that avoid "stepping on the toes" of other subroutines. In other words, subroutine modules should be written in such a way that they are independent (or "insulated") from each other. In the months to come we will continue to develop this concept of independent subroutine modules. We will also see many "usable" examples of such modules.

The assembler that we will be using to create these modules is EDASM. For many years, EDASM has been the "official" assembler supplied by Apple Computer, Inc. Consequently, it makes a good standard for publishing 6502 code, since most experienced Apple assembly language programmers have used it at one time or another. In addition, I personally feel that EDASM still does the best job of handling the concepts of relocatable code and subroutine libraries -even better than any of the newer assemblers (including the much heralded ORCA). However, if you do prefer using another assembler, it should be almost a trivial matter for you to convert the source listings of the subroutine modules we will be developing. (After all, every 6502 assembler uses pretty much the same mnemonics.) *If you are unfamiliar with how EDASM handles the concepts of relocatable code and subroutine libraries, I suggest you read the article titled ``Using EDASM To Generate Relocatable Code", which immediately follows this article.* You will see that relocatable subroutines are no harder to write or use than non relocatable ones.

Maintaining Integrity

Let's get started. Guidelines "a" and "b" tell us that our subroutines cannot simply help themselves to either the index registers or memory locations on Page Zero without first saving them someplace so that they can be restored after their use. Therefore, the first subroutine module we will look at, SAVE0, is designed to help us with this task. Listing 1 is the source listing for SAVE0, and Figure 1 describes how to use it.

Notice that the SAVE0 module contains two separate subroutines - SAVE0 and UNSAVE0. (It is common practice to name a module after one of its ENTRYs. This is especially true for modules that have only one ENTRY.) The ENTRY named SAVE0 saves (on the stack) a specified number of Page Zero locations starting with $0000. Therefore, if your subroutine requires the temporary use of Page Zero, you cannot just haphazardly pick and choose your memory locations. You must allocate them sequentially starting from $0000. Then, when your subroutine is finished, simply have it perform a

JMP UNSAVE0

to restore those Page Zero locations and the index registers.

Please rate this article on the Reader Service Card by circling:

61 Excellent **62** Good **63** Fair **64** Poor

For Example...

As an example of the use of the SAVE0 module, consider the listing of the COLORMAP module shown in Listing 2 (The documentation for COLORMAP is shown in Figure 2.) The COLORMAP module contains two ENTRYs: COLORMAP and CMINIT. Conceptually, COLORMAP is a very simple subroutine. It merely changes each color pixel on the Lo-Res graphics screen into a new color. The set of new colors are specified as a 16-byte table (since there are 16 Lo-Res colors), which is passed to the initializing subroutine, CMINIT. Each element of the table indicates the new value for that corresponding color (i.e., the first element of the table indicates the new color for black pixels, the next element of the table indicates the new color for magenta pixels, etc.)

FIGURE 1

Module: SAVE0 **Length: $0036**

ENTRYs: SAVE0, UNSAVE0

EXTRNs: none

Description of SAVE0:

SAVE0 saves the X and Y index registers on the stack, along with a specified number of sequential locations on Page Zero. The number of locations (starting with $0000) to be saved is passed in the A register.

For example, the following sequence:

```
LDA    #$03
JSR    SAVE0
```

would save memory locations $0000, $0001, and $0002 (along with the X and Y registers).

Description of UNSAVE0:

UNSAVE0 restores the X and Y registers and the Page Zero locations that were saved by the most recent call to sub-routine SAVE0, and then performs an automatic RTS for your subroutine. (UNSAVE0 has no calling parameters and is invoked with a JMP instruction, not a JSR.) The JMP to UNSAVE0 must be the very last operation performed by the subroutine since it automatically returns control back to the module that called your subroutine.

For example, to restore the index registers and the three Page Zero memory locations that were saved in the previous example, you would simply terminate your subroutine with the following instruction:

```
JMP    UNSAVE0
```

Notice that subroutine CMINIT requires the temporary use of six memory locations ($0000-$0005) on Page Zero. Therefore it begins by loading the accumulator register with the value $06, and then invokes the SAVE0 subroutine. (See Listing 2, Lines 62-63.) Then, in line 99 of Listing 2,

LISTING 1

```
1   REL
2               ORG     $1000
3   *
4   ENTRY       SAVE0
5   ENTRY       UNSAVE0
6   *
7   *SAVE X-REG,Y-REG,& ZERO
    PAGE
8   *
9   *ENTER WITH: A-REG
    CONTAINING
10  *THE NUMBER OF BYTES (1-128)
11  *OF ZERO PAGE TO BE SAVED.
12  *
13  SAVE0       STA     TEMP+0
14              PLA
15              STA     TEMP+1
16              PLA
17              STA     TEMP+2
18              TXA
19              PHA
20              TYA
21              PHA
22              LDX     #0
23  PUSHER      LDA     $00,X
24              PHA
25              INX
26              CPX     TEMP+0
27              BNE     PUSHER
28              TXA
29              PHA
30              LDA     TEMP+2
31              PHA
32              LDA     TEMP+1
33              PHA
34              RTS
35  *
36  *RESTORE ZERO PAGE, Y-REG, &
    X-REG
37  *
38  UNSAVE0     PLA
39  TAX
40  DEX
41  PULLER      PLA
42              STA     $00,X
43              DEX
44              BPL     PULLER
45  UNSAVED     PLA
46              TAY
47              PLA
48              TAX
49              RTS
50  *
51  TEMP        DS      3
52  *
53  LSTOFF,NOASYM
```

CMINIT terminates by issuing a

JMP UNSAVE0.

The "Dazzler" Program

Subroutine COLORMAP also uses some locations on Page Zero, so it too invokes subroutine SAVE0 (in Lines 17-18).

Before using the COLORMAP subroutine, you must first invoke subroutine CMINIT to initialize the look-up table. Then, every time you invoke subroutine COLORMAP, each Lo-Res graphics pixel will change to its new color. This can produce some dazzling "animation" effects. For example, consider the AppleSoft BASIC program shown in Listing 3. This "Dazzler" program first generates a color pattern in the shape of a diamond (Lines 100-190). Then, it "animates" this diamond in the last four lines of the listing. (The program assumes that the COLORMAP module has already been loaded at $1000.) You might want to try using the COLORMAP module to create some Lo-Res dazzlers of your own. Also, you might be interested in trying different Color Tables other than the default one. If you do want to use a different Color Table, you do not have to reassemble the listing in Figure #2 Simply change the two byte pointer at CMINIT-2 and CMINIT-1 to point to the new 16-byte Color Table. Remember, one of the advantages of working with properly designed Independent subroutine modules is that, once they are assembled and debugged, you never need to reassemble (or even look at) their source codes again.

That's all for this month. In the next installment we'll look at some independent subroutine modules for playing 3-note musical chords through the Apple's built-in speaker, and you won't even need an Apple IIGS to do it!

See the end of EDASM article (page 44) for the Cauzin Strip containing these programs.

LISTING 2

```
1                       REL
2                       ORG     $1000
3   *
4                       ENTRY   COLORMAP
5                       ENTRY   CMINIT
6                       EXTRN   SAVE0
7                       EXTRN   UNSAVE0
8   *
9   TABLE               EQU     $00
10  COLORS              EQU     $02
11  INDEX               EQU     $04
12  TEMP                EQU     $05
13  *
14  *MAP EACH LO-RES PIXEL
15  *INTO ITS NEXT COLOR
16  *
17  COLORMAP    LDA     #$02
18                      JSR     SAVE0
19                      LDA     SCRATCH+0
20                      STA     TABLE+0
21                      LDA     SCRATCH+1
22                      STA     TABLE+1
23                      LDX     #119
24  MAPLOOP     LDY     $0400,X
25                      LDA     (TABLE),Y
26                      STA     $0400,X
27                      LDY     $0480,X
28                      LDA     (TABLE),Y
29                      STA     $0480,X
30                      LDY     $0500,X
31                      LDA     (TABLE),Y
32                      STA     $0500,X
33                      LDY     $0580,X
34                      LDA     (TABLE),Y
35                      STA     $0580,X
36                      LDY     $0600,X
37                      LDA     (TABLE),Y
38                      STA     $0600,X
39                      LDY     $0680,X
40                      LDA     (TABLE),Y
41                      STA     $0680,X
42                      LDY     $0700,X
43                      LDA     (TABLE),Y
44                      STA     $0700,X
45                      LDY     $0780,X
46                      LDA     (TABLE),Y
47                      STA     $0780,X
48                      DEX
49                      BPL     MAPLOOP
50                      JMP     UNSAVE0
51  *
52  * INITIALIZE THE COLOR TABLE
53  *
54  * ENTER WITH:
55  * SCRATCH: POINTER TO 256
      BYTES
56  * OF SCRATCH MEMORY
57  * MAP: POINTER TO THE
      COLORMAP
58  *
59  SCRATCH     DW      $9600
60  MAP         DW      DEFAULT
61  *
62  CMINIT      LDA     #$06
63                      JSR     SAVE0
64                      LDA     SCRATCH+0
65                      STA     TABLE+0
66                      LDA     SCRATCH+1
67                      STA     TABLE+1
68                      LDA     MAP+0
69                      STA     COLORS+0
70                      LDA     MAP+1
71                      STA     COLORS+1
72                      LDX     #$00
73  INITLOOP    TXA
74                      AND     #$0F
75                      TAY
76                      LDA     (COLORS),Y
77                      STA     TEMP
78                      TXA
79                      LSR     A
80                      LSR     A
81                      LSR     A
82                      LSR     A
83                      TAY
84                      LDA     (COLORS),Y
85                      ASL     A
86                      ASL     A
```

```
 87                ASL     A
 88                ASL     A
 89                ORA     TEMP
 90                STX     INDEX
 91                LDY     INDEX
 92                STA     (TABLE),Y
 93                INX
 94                BNE     INITLOOP
 95                STA     $C050
 96                STA     $C052
 97                STA     $C054
 98                STA     $C056
 99                JMP     UNSAVE0
100 *
101 * THE DEFAULT COLOR MAP:
102 * EACH COLOR MAPS INTO
103 *  THE NEXT HIGHER COLOR
104 * (WITH WHITE MAPPING BACK
105 * AROUND INTO MAGENTA AND
106 * WITH BLACK MAPPING INTO
107 * ITSELF)
108 *
109 DEFAULT DFB 0,2,3,4
110 DFB 5,6,7,8
111 DFB 9,10,11,12
112 DFB 13,14,15,1
113 *
114 LST OFF, NOASYM
```

FIGURE 2

Module: COLORMAP **Length: $00B4**

ENTRYs: COLORMAP, CMINIT

EXTRNs: SAVE0, UNSAVE0

Description:

COLORMAP maps each Lo-Res pixel into its "next" Lo-Res color. The "next" color is determined by a 16-byte Color Table (see CMINIT). There are no explicit calling parameters for COLORMAP itself.

CMINIT is an initializing routine which must be called once, prior to the first call to COLORMAP. CMINIT uses the 16-byte Color Table to create a 256-byte look-up table (used by COLORMAP), and sets 40x48 Lo-Res graphics mode.

Enter CMINIT with:

CMINIT-4: A two-byte pointer to 256 bytes of scratch memory. (These 256 bytes will be used for the construction of the look-up table, and must therefore remain intact.) The default value for this parameter is $9600.

CMINIT-2: A two-byte pointer to the 16-byte Color Table. The first byte in a Color Table specifies the color into which black (Color=0) will be mapped, the second byte specifies the color into which magenta (Color=1) will be mapped, etc. This two-byte pointer initially points to a default Color Table which maps each color into its next higher color, with white mapping back around into magenta and with black mapping into itself.

Both CMINIT and COLORMAP Return with:

X-Register: unmodified
Y-Register: unmodified

LISTING 3

```
 10  GR : HOME : POKE - 16302,0
 20  INIT = 4096 + 5 * 16 + 11
 30  MAP = 4096
100  FOR Y = 0 TO 23
110  FOR X = 0 TO 19
120  Z = INT ((X + Y) / 2) + 1
130  IF Z > 15 THEN Z = Z + 1
140  COLOR= 32 - Z
150  PLOT 20 + X,24 + Y
160  PLOT 19 - X,24 + Y
170  PLOT 19 - X,23 - Y
180  PLOT 20 + X,23 - Y
190  NEXT X,Y
200  CALL INIT
300  CALL MAP
310  FOR Z = 1 TO 25: NEXT Z
320  GOTO 300
```


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Using EDASM To Generate Relocatable Code

Bob Bishop

EDASM was one of the first assemblers written for the Apple Computer. Its birth dates back to somewhere in the late 1970's. The most current version is available as part of the Programmer's Workbench, published by Apple Computer, Inc.

Even from its inception, EDASM was designed with the idea of being able to generate relocatable object code. However, it wasn't until 1983 that a Linker Loader was finally written to handle these relocatable object files. Until now, only a handful of programmers were even aware of the existence of the EDASM Linking Loader.

What Is Relocatable Code?

Before discussing what is meant by relocatable code, let's first discuss what is meant by nonrelocatable (or absolute) code.

Every EDASM source listing normally begins with an ORG pseudo-op. This ORG pseudo-op tells the assembler the memory location into which the object code is to ultimately be loaded. Once the source code is assembled, the resulting object code will generally execute properly only if it is loaded into the memory locations defined by the ORG statement in the source listing. For example, if one of the lines of the source code contains a JMP instruction, the assembler will convert its operand (column 3 of the source listing) into the absolute address to which the jump will occur. Because of such possible absolute references to memory, this type of code is referred to as a nonrelocatable module.

A relocatable module, on the other hand, is one which can be loaded into almost any memory location and still work properly. However, the loading of such code must be accomplished by a special program called a Linking Loader.

If there were nothing more to relocatable code than the fact that it can be loaded into any memory location and still work, there would be very little to cheer about. One might argue that it would be just as easy to change the ORG statement at the beginning of the source code and simply reassemble that code to a new memory location. But the real power behind relocatable modules is the fact that they inherently contain all the information necessary to allow each loaded module to find any other module that is loaded!

Suppose relocatable subroutine A calls relocatable subroutine B. Since subroutine B can eventually be loaded anywhere into memory, how does subroutine A know which memory location should be jumped to in order to reach subroutine B? To answer this question we must first discuss the concepts of local symbols and global symbols.

Local Symbols vs. Global Symbols

In simple terms, a local symbol is just a label. Unless specifically declared otherwise, every label defaults to being a local symbol. Suppose you have a source listing which contains the label, LOOP. Suppose that another source listing on a completely different source file also has LOOP as one of its labels. Obviously, the two labels are distinct because they appear in two separate source listings. Neither listing is aware of the existence of the other one. If there is an instruction in either one of the listings that says JMP LOOP, there is no confusion. The jump will always occur to the proper label.

However, it *is* possible to write programs that do

Continued on pg. 43

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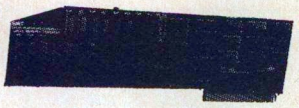

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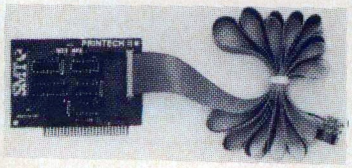

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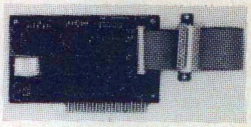

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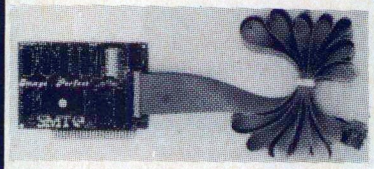

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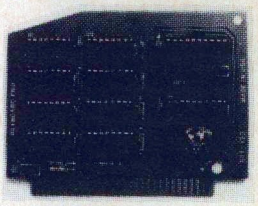

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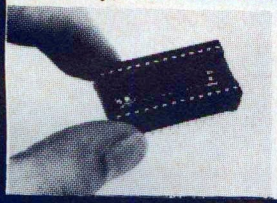

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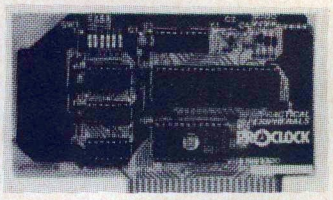

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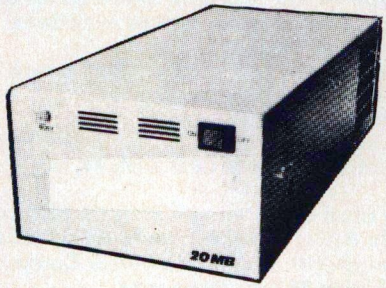

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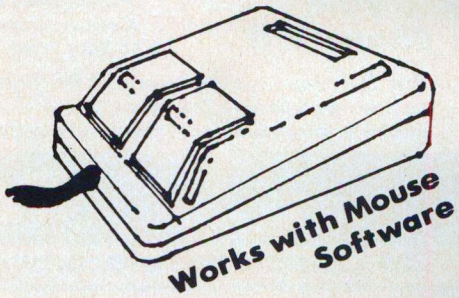

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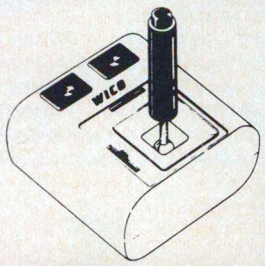

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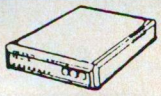

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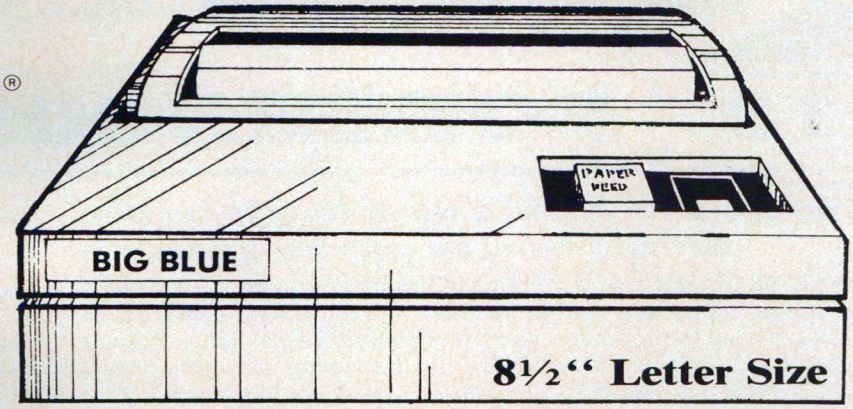

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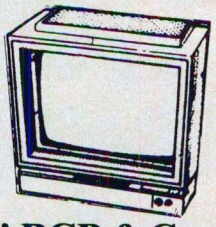

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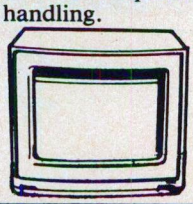

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X-10 POWERHOUSE

Works as a remote control and a timer for your appliances and lamps without tying up your computer!

The X-10 POWERHOUSE interface is programmed through your computer. The easy to follow software allows you to select a room, the appliances or lights within the room and the time to turn them on or off. Then, when you are done, disconnect the interface from the computer and it works on it's own! Your computer is free to compute and the interface continues to send digital signals over existing wiring to the plug-in-modules (sold separately) connected to the appropriate devices. List $99.95 **SALE $49.95**

You can set the timer for all seven days of the week. Wake up to the stereo, start your coffee and light up the bedroom during the week and don't worry about any disturbances on the weekends. Modules are available for your appliances, air conditioners, central heating, diming lights, outside lights, two and three way switches and just about any electrical device. Works with BSR, GE, Leviton, Radio Shack, and Sears Roebuck modules (all 256 codes addressable).

CONTROL INTERFACE

SALE
$59.95

Get a FREE Lamp Module wtih your purchase of the Contol Interface.

CONTROL MODULES	List	SALE
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Wall Switch - 500 watt, dims/brightens	$19.95	$14.95
3 Way Wall Switch - incandescent lights, for lights controlled by 2 or more wall switches	$24.95	$19.95
Thermostat Controller - controls your exsiting thermostat	$39.95	$29.95
2 Pin Appliance Module - up to 500 watts	$19.95	$14.95
3 Pin Appliance Module - up to 500 watts	$19.95	$14.95

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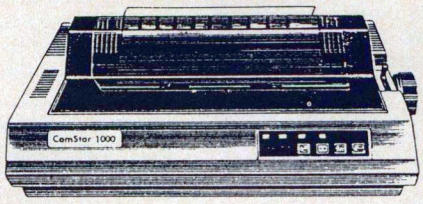

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The Comstar 1000 is one of the best value in the United States today. Print your letters, documents, programs, pictures, and more at a blazing 100 Characters Per Second or 36 CPS in the Near Letter Quality mode. (Looks just like it came from a typewriter.) Plus, choose your printing modes (NLQ, Draft) from your word processor or by simply pushing the controls on the front panel. Fantastic Quality at a Fantastic Price. List $349.00 **SALE$189.95**

Print Method
Serial impact dot matrix (9 pin)
Paper Feed
Adjustable tractor and friction feed
Ribbon (Life exp.)
Black: cassette (2.5 million characters)

Character Sets
96 ASCII Characters, Symbols (include italic font)
Dimensions
15.4 (W) x 10.9 (D) x 4.7 (H) inch

Copies
2 plus original
Weight
Approx. 10.0 lbs
Character Spacing
Fixed

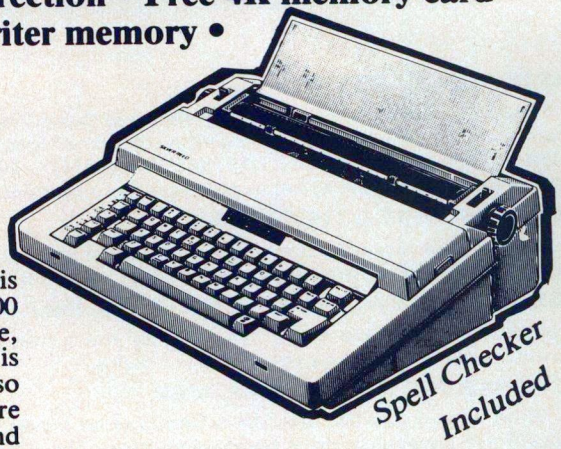
Line Spacing
1/6, 1/8, 1/72, and 1/216 inch
Paper feeding Direction
Bi-directional
Print Speed
Draft- 100 CPS NLQ- 20 CPS

Electronic Compact Printer/Typewriter

Now with "Spell Check"

• Supreme quality printer/typewriter with all the features of the above model plus more • 90,000 word dictionary • LED readout flags mistakes before they reach print • 1 line/240 character automatic correction • Free 4K memory card • Edit 2 to 4 pages from typewriter memory •

Sale $299.95 List $399



Get the edge over classmates, colleagues and competitors with this fantastic printer/typewriter with **"Spell Checker"**. With over 90,000 words in its dictionary and the capacity to add 510 more of your choice, you may never misspell again. No more re-typing, when an error is identified, three beeps sound. The LED readout has a one line buffer so mistakes are corrected before they reach print. This means you're virtually ensured of nothing less than perfectly typed letters and documents with no misspellings! Also, you receive a **free** 4K memory card with your purchase. This card equips the typewriter with 4,000 characters of storage which is equal to approximately 2 to 4 pages of typing. Edit right on your typewriter using your LED screen. A $45.00 list value for FREE! Fantastic! List 399.00 **SALE $299.95**

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Disk Drive Cleaner

- 60% of all drive downtime is directly related to poor maintaince.
- Drives should be cleaned each week regardless of use.
- Drives are sensitve to smoke, dust and all micro particles.
- Systematic operator performed maintenance is the best way of ensuring error free use of your computer system.

This unique twin slot jacket design gives twice as many "wet-dry" cleanings per rotation as other leading brands. Non abrasive, 100% lint free, random fiber cleaners capture dust, smoke particles and disk oxide build up which insures you against disk and data loss from dirty disk drive heads just like you must clean your albums and tape players you must clean your disk drive heads to keep your disk drive working well. (24 cleanings per kit.) List $19.95 **Sale $9.95.**

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Super 1/2 Price

Anti-Static Keyboard Cleaner

Now clean your computer keyboard fast, efficiently, and safely. The cleaning solution is exclusively formulated to remove skin oils, dust, and dirt that destroy your equipment. Plus this non residue solution with anti-static properties will not build up like ordinary household cleaners so clean as much as you like without worry. Plus the lint free, high absorbency, nonabrasive cloths will not scratch or mar your equipment. List $19.95 **Sale$9.95.**

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Just like a record needle, disk drive heads must travel hundreds of miles over disk surfaces. Unlike other floppy disks the smooth surface finish saves disk drive head wear during the life of the disk. (A rough surface will grind your disk drive head like sandpaper). The lint free automatic CLEANING LINER makes sure the disk-killers (dust & dirt) are being constantly removed while the disk is being operated.

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AppleWorks contains:

- the Word Processor for producing letters and reports.
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Appleworks saves you time and effort:

- commands are consistent amoung applications, so when you know one application, you know them all.
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System Requirements:

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- three blank disks
- monitor
- compatible printer (recommended but not needed)

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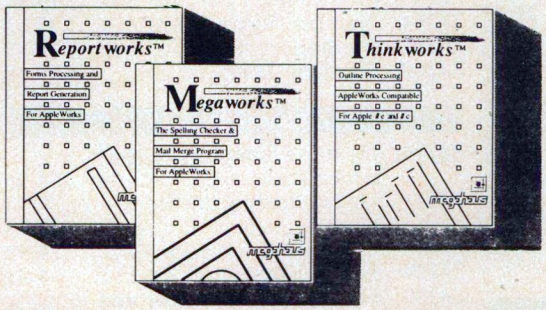

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ThinkWorks — ThinkWorks is the powerful stand alone outline that works with *AppleWorks*. Use ThinkWorks to organize any kind of information: lesson plans, reports, lists and proposals. It is the only outline processor that allows you to combine outlines, and to include an outline inside an AppleWorks word processing document. (Disk) List $125.00 **SALE $59.95** *Coupon $49.95*

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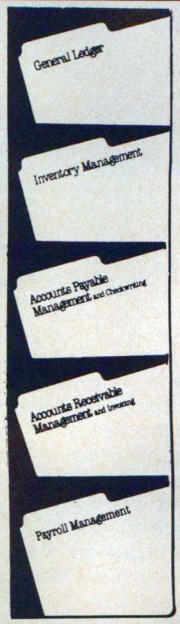

VersaLedger II —VersaLedger II is a complete General Ledger. VersaLedger II stores all check register information forever, gives an instant cash balance at any time, and prints 17 customized reports (including check registers, balance sheets, income statements, transaction reports and account listings.) Interfaces with all the following programs. (Disk) List $149.95 **SALE $79.95**

VersaInventory — VersaInventory is a comprehensive inventory control system that keeps track of descriptions, pricing, and vendor information for every item in stock, what is being sold (and removed from stock) what stock has been depleted to a user-defined reorder point and what items are actually out of stock. VersaInventory can be used alone or can be interfaced with VersaLedger II, VersaReceivables or VersaPayables. (Disk) List $99.95 **SALE $59.95**

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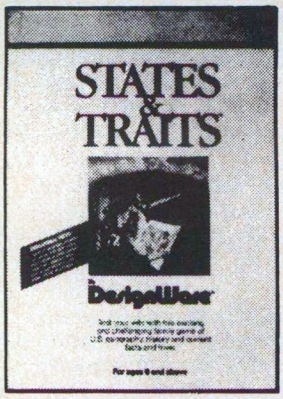

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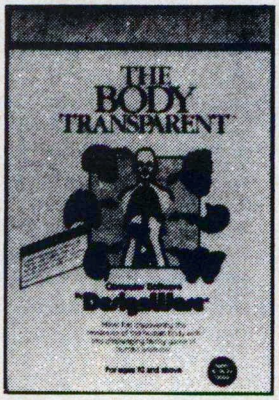

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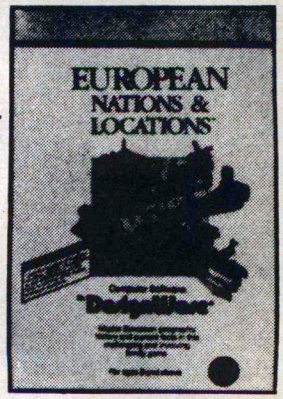

States & Traits — A valuable learning tool for geography and history students. Learn basic geography and then go on to find out interesting facts about every region in the country. Find out where historical events happened on the map. As you play quick answers are rewarded with bonus points. In the "States" part of the program you must move states into the right place on the map and the state lights up in bright color. In "Traits" you identify state capitals and landmarks. You can also design your own games (Disk) List $44.95 **SALE $23.95**

The Body Transparent — Learn basic anatomy as you play a game of facts and functions of the human body. Choose a male or female body and move bones and organs to their location. Then learn what the body parts perform. Find out where food is digested, the importance of kidneys and much much more. Add your own biology questions to help make homework fun or to challenge a friend. The game has multiple difficulty levels and bonus points for quickness, plus color graphics. (Disk) List $44.95 **SALE $23.95**

European Nations and Locations — An exploration of the continent that combines important facts and information in a challenging game format. The only European geography program that allows you to add questions of your own. If you miss a question during game play it is recycled to guarantee learning. Each game, you move nations to the proper location on a map of Europe. The map fills in with color as questions are correctly answered. Speed is rewarded with bonus points. Winner of the Parents Choice Award. (Disk) List $44.95 **SALE $23.95**

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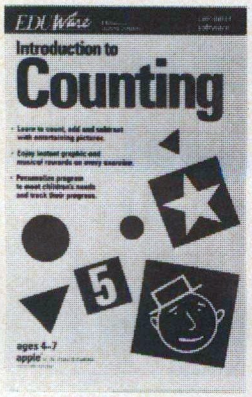
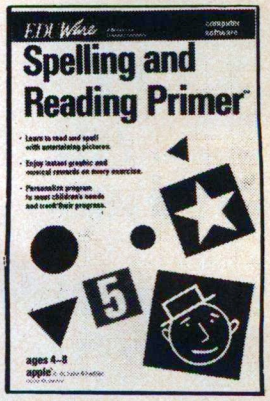
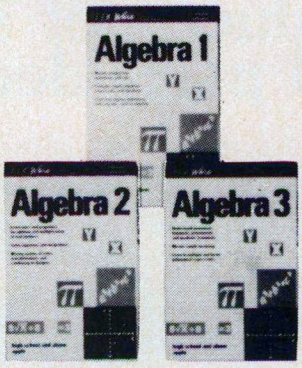


Algebra 1,2, or 3 — An introduction to Algebra concepts and definitions. Helps students master the fundamentals of first year Algebra, addition of real numbers, multiplication of real numbers, solving equations, solving inequalities and absolute value sets. Students can learn in 4 ways: They can work the sample problems, read discussions of concepts, watch equations being solved, or study rules that govern mathematic operations. The result is that the student creates a learning process that he or she is most comfortable with. (Disk) List $39.95 **SALE $19.95**



Introduction to Counting — This colorful, animated tutorial introduces the concepts of counting, addition, subtraction, height, weight, measurement, and shape discrimination in eight carefully designed learning units. Young children discover the world of numbers and build a solid foundation in basic arithmetic. There's even a built-in "Learning Manager" to tailor the program to your child's increasing abilities. (Disk) List $39.95 **SALE $22.95**



Spelling and Reading Primer — You are taught spelling and reading skills in an entertaining tutorial format. This learning system introduces your child to spelling and reading by linking drawings of familiar objects with words and basic word groupings. Twenty-two word lists cover a wide range of vocabulary from simple one-syllable words, to multi-syllable words with dipthongs, and special categories such as directions and numbers. (Disk) List $39.95 **SALE $22.95**

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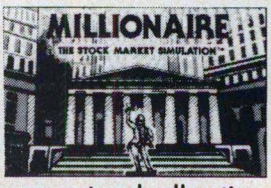

Squire — This unique game lets you "play your own personal game of life-with real life goals and a game plan you devise. The basic game starts at age 35 with $70,000. Your goal is retirement at 55 with a net worth of $1,000,000. During the session you may receive an inheritance or windfall gifts. But you may also receive unexpected setbacks. In the "reality mode" you enter your present age, current assets, and desired retirement lifestyle and date. (Disk) List $49.95 **SALE $22.95**

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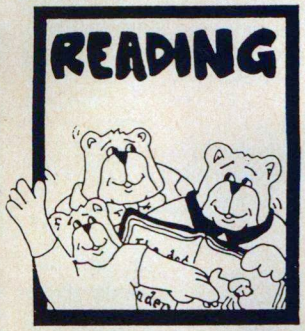
STICKYBEAR READING — What can be more important to a parent than a child's ability to read? Fortunately Stickybear is here to help. Included is a **PARENT GUIDE**, that offers many helpful suggestions to get your child involved. The book, **The Stickybear's Scary Night**, is a special bonus to introduce your child to the amusing bear family. The combination of bright graphics, wonderful animation and a format designed with a child's frame of reference in mind, are guaranteed to provide the balance that will help your child learn to read. (Disk) List $39.95 **SALE $22.95**



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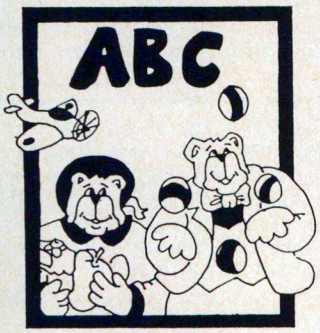
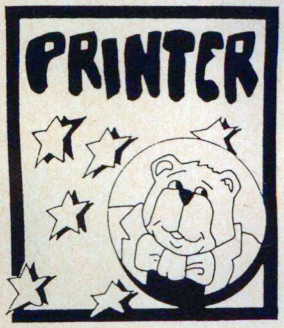
STICKYBEAR TYPING — Learn to type with Stickybear. The manual included with the software, explains easy-to-follow techniques that will develop keyboard skill and accuracy. You are advised to sit in a comfortable position, feet properly placed, fingers poised. Let the bear be your guide as you move from beginner level to the more advanced exercises. When you are confident in your ability, you can play one of the challenging games. We recommend this for kids of all ages. (Disk) List $39.95 **SALE $22.95**

STICKYBEAR ABC — A program that teaches your preschool child the alphabet and computer awareness. The games are easy for a youngster to play alone. All the child needs to do is press a key and that letter will appear on the screen, along with a colorful picture. This reinforces letter and word recognition. A full color poster can be used along with the software. Look for many good tips in the Adult Instructions to continue your child's education. You can rely on the Stickybear approach to learning. (Disk) List $39.95 **SALE $22.95**

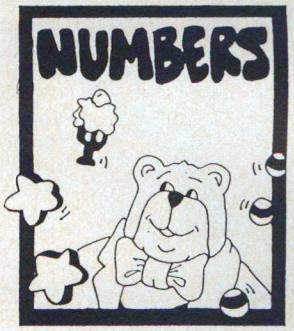


STICKYBEAR SPELLGRABBER The Stickybear method for improving spelling skills is challenging and fun for children grades 1 through 4. Each of the three games motivate the child to increase spelling ability. Over 4,000 commonly used words are included plus you can store up to three lists of 50 words that you choose to study. The quicker a word is spelled the more points you will have at the end of the game. The amusing games are Picture Spell, Word Spell and Bear Dunk. Up to 3 people can play each game. (Disk) List $39.95 **SALE $22.95**

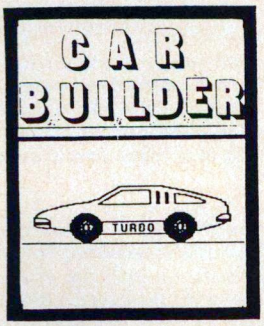


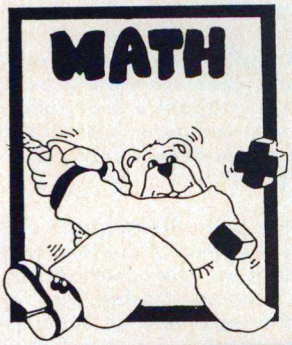
STICKYBEAR PRINTER — Put your stamp of individualtiy on everything you create. Pictures, panels, notes, wrapping paper, stationery, greeting cards and more are easily done with Stickybear Printer. Included are dozens of backgrounds and border patterns, hundreds of decorations, and ten fonts for designing custom pictures, stories and cards. Stickybear Printer supports most popular printers. (Disk) List $39.95 **SALE $22.95**

STICKYBEAR NUMBERS — Stickybear Numbers allows a child as young as three, to work on the keyboard with little assistance from the parent. By simply pressing a number key, that number and brightly colored objects appear on-screen in that amount. As numbers are recognized and understood, a parent can help with counting games. Includes a full color poster. For ages 3 to 6. (Disk) List $39.95 **SALE $22.95**



CAR BUILDER — Become a designer with this ultimate car design program. Station wagon, sports car, sedan, or whatever you choose. As the design engineer, you select the chassis, engine, suspension system, custom body and all other components. Run it through a full testing procedure, including wind tunnel and test track. No limit to the number of different cars you can design. (Disk) List $39.95 **SALE $22.95**





STICKYBEAR MATH — Learning to add and subtract with the Stickybear family is great fun for children ages six to nine. The bears are caught in amusing situations and your child must help them avoid obstacles by correctly answering math problems. Your child can work at his or her own pace. The difficulty level adjusts to the child's ability. You can check your child's progress with a special Report Card option. (Disk) List $39.95 **SALE $22.95**

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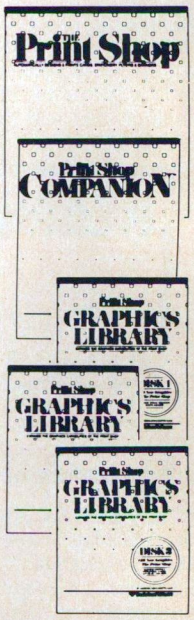
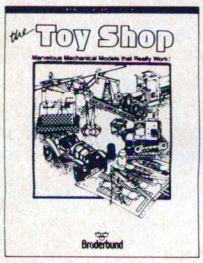


The Print Shop — This program is turning thousands of home computer owners into do-it-yourself printers. They're making greeting cards for family and friends, stationery for personal and buisness use, banners, signs and notices, school projects, advertising flyers... The list goes on and on and on. The best selling Print Shop program is menu driven and highly visual. By simple choosing and arranging the various elements of a message, users can produce a finished original piece in minutes. There are eight type styles, dozens of pictures and symbols, a graphic editor for your own creations, border designs, abstract patterns, and much more. The Print Shop comes with an illustrated reference manual full of examples of what can be created using the program, and a bonus sampler of bright colored pinfeed paper and matching envelopes. The Print Shop supports most popular printers. (Disk) List $49.95 **SALE $25.95**

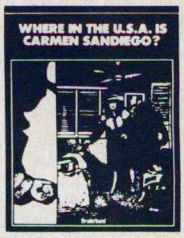
Print Shop Companion — Increase the graphic ability of the Print Shop dramatically with the Companion, a program that adds 12 new fonts and 50 new borders, ready to use with your original Print Shop, which the Companion will update to accept fonts and borders from "other" disks. Plus you can also create original borders and fonts, design sophisticated graphics, unusual background tiles and much, much more. Anyone who has a Print Shop will want this wonderful addition. (Disk) List $39.95 **SALE $21.95**

The Print Shop Graphics Library 1, 2, or 3 — Introducing Disks 1, 2, & 3 of The Print Shop Graphics Library. They expand the graphic capabilities of The Print Shop. Here are many bright new ways Print Shop owners can have even more fun with The Print Shop. These disks have many new ready-to-use graphics. Categories include: holidays, special occasions, sports, school, the Zodiac, animals and more. Dozens of ways to be even more creative with The Print Shop. (Specify Disk No.) List $24.95 **SALE 14.95 each**

The Print Shop Graphics Library Holiday Edition — The newest addition to The Print Shop Graphics Library series is a volume devoted to the holidays — from New Year's to Christmas. It includes dozens of ready-to-use graphics, fonts and borders you can use to create totally unique Print Shop greeting cards, banners, signs, and letterhead. Requires The Print Shop. (Disk) List $24.95 **SALE $14.95**

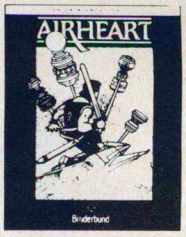


The Toy Shop — With a computer, a printer and The Toy Shop, you can create a steam engine, an antique carousel...a total of 20 models that really work. Simply choose a project from the on-screen menu, then add custom patterns, hi-res graphics and text. Print the parts and mount them on the adhesive cardstock included in the package. Then cut out and assemble the model. The Toy Shop also includes wire, wooden dowels, cotton cord, rubber stripping and balloons. Every toy is a working mechanical marvel — from an operable tractor crane to a gravity defying balancing jet. (Disk) List $59.95 **SALE 39.95**

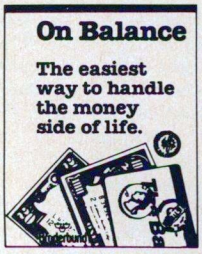


Where in the U.S.A. is Carmen Sandiego? — The much asked question which demands that you discover the answer. This is the sequel to the popular *Where In The World Is Carmen Sandiego?* As you attempt to solve the mystery your are exposed to facts about geography, the economy and the history of the 50 states. Fidor's USA Travel Guide is included in the package, to help with the search. As you become a better detective the game gets more difficult. A great combination of mystery, trivia and arcade animation. (Disk) List $44.95 **SALE $28.95**

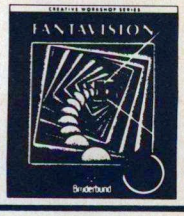
Type! — With Type!, you'll learn to type quickly, accurately and for keeps. Unlike other learn-to-type software, Type! is the first program to take advantage of extensive research on how you learn to type. Whether you're a beginner or nearly an expert, Type!'s interesting lessons and advanced diagnostics will help you by displaying graphics and printouts of your performance, and by recommending customized exercises to improve your speed and skill. (Disk) List $44.95 **SALE $28.95**



Airheart — The exciting arcade-style rescue game that requires total concentration and skill. Pilot your jet-sled over the ocean to save a sleeping prince from his captors at sea and return him to his kingdom. The robot guardians of the prince will try to prevent your access to him and you will need to be clever in order to be named the legendary hero, Airheart. (Disk) List $34.95 **SALE $22.95**



On Balance — The personal financial program that really is easier to use than the others. Begin putting your accounts in order instantly with no complicated setup time. This one piece of software helps you organize everything from your checkbook to your tax records. Keeps track of your income and expenses, so that you can plan a budget that suits your lifestyle. Also prints reports that reflect your net worth and the total spent on each bill. (Disk) List $99.95 **SALE 64.95**



Fantavision — A special effects graphics and animation package using advanced computer graphics techniques familiar from television and futuristic movies. For use as a toy or a tool for home and education. The powerful automatic features include: creation of "in-between" frames, zooming, flipping, copying, cloning and more. Plus you can make a self-booting disk for creation and sharing of movies. A must for graphics buffs. (Disk) List $49.95 **SALE $31.95**

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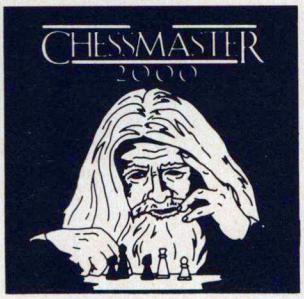
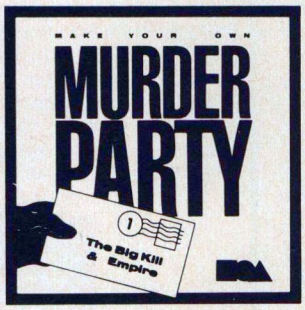
SEVEN CITIES OF GOLD — This historically accurate program is set in the 16th Century world of the Spanish Conquistadors. There are over 2800 screens to explore and 200 native settlements. The computer maps all of the discoveries you make. All communications are by gesture as you face the same problems Columbus encountered — disease, unfriendly natives and food supply. (Disk) List $39.95 **SALE $9.95**

MARBLE MADNESS — A huge arcade hit that is a mix of sports competition, kinetics and strategy. You maneuver marbles across six different levels of raceways. The levels vary with crazy creatures to deal with. Each has an original music score and sound effects. The visuals and special effects are incredible to see. 8 levels of play will prove challenging for even the veteran player. (Disk) List $34.95 **SALE $24.95**

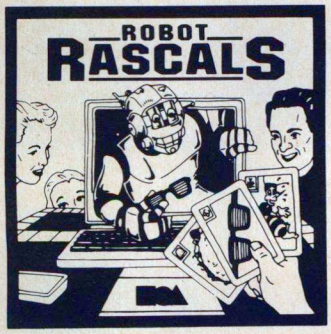
ARTIC FOX — The Artic Fox moves along on caterpillar treads, imitating the movement of a real tank. The three dimensional landscape has realistic properties like mountains and lakes for you to maneuver around. The controls are fully functional and include weapons. You have lasers, canons and point-of-view guided missiles for aerial reconnaissance. Continuous combat will test your reaction skills. There are four enemy bases to destroy and 3 levels of difficulty. (Disk) List $39.95 **SALE $27.95**

CHESSMASTER 2000 — The challenge and strategy of chess combined with the graphic capabilities of your computer. The U.S. Chess Federation rated this game higher than Sargon III. Features microcomputing's largest quantity of positions with more than 71,000. There are 12 levels of play from "Newcomer" to "Grandmaster". A special teach mode shows all possible moves and another gives hints on moves to make in difficult situations. You can save and print out games. (Disk) List $39.95 **SALE $27.95**

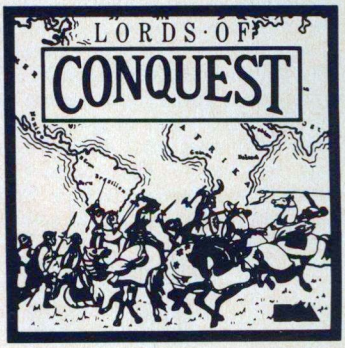




MAKE YOUR OWN MURDER PARTY — Throw your most memorable party, one your guests will not forget. The theme of the bash is a murder mystery and your friends are the characters involved in the crime. No one knows the killer's identity and must rely on clues to piece the puzzle together. Your guests act out their roles as the group plays round after round. So mail out the invitations, print out the clues and go party! (Disk) List $39.95 **SALE $27.95**



ROBOT RASCALS — You play a card game and a computer game at the same time. Make your choice of a robot and send him on a scavenger hunt across the playfield. Watch out for the "luck" card, if you draw it , it could ruin your winning hand. Hidden in the landscape are the objects you need, but a wrong move could put your robot out of commis ion. To shake you up, the computer will change the rules. (Disk) List $42.95 **SALE $29.95**



LORDS OF CONQUEST — The challenging strategy game that takes the most exciting qualities of the board game Risk and adds advanced ingredients of the computer age. Conquering the world is the object and the battlefield is a map of the world. Determine your home country and where to place your armies. Each game is unique because there is a different world to conquer every time you play. Features five forces: foot soldiers, cavalry, fleets, adjoining territories and cities. Sitting down at a board game was never this much fun...(Disk) List $39.95 **SALE $27.95**

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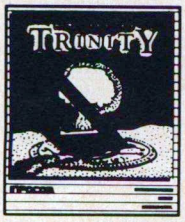
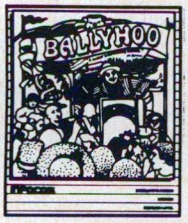


Ballyhoo — The circus is not all entertaining performances and cotton candy. Lots of secrets lurk behind the 'big top' and you become involved in the weaving of a mystery as one of the key players. The owner of the circus is frantic, his daughter has been kidnapped. Can you find her? If the criminals who have her find you before you find them you could be in serious danger. This game combines the wonders of a real circus with the elements of a deep mystery and does it well. (Disk) List $34.95 **SALE $24.95** *Coupon $22.95*



Moonmist — A wonderful gothic mystery that will appeal to the romantic side of you. A dear friend is in deep trouble, her castle may be haunted, You must help her to hunt down this ghost and return her life to normal. This story is similar to the Nancy Drew mysteries that have been charming girls for years. This features a cast of unusual characters, hidden treasures and four variations. A classic tale! (Disk) List $34.95 **SALE $24.95** *Coupon $22.95*

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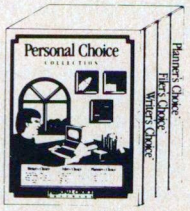

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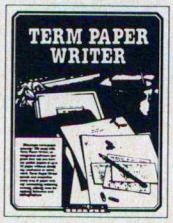

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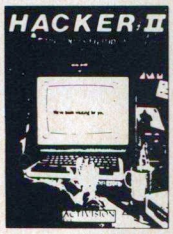
Hacker II — The suspense of the original Hacker continues, with an even more complicated mystery to resolve. You uncover a plot when you accidently tap into a file marked, *The Doomsday Papers*. What they reveal will shock you! The actions you decide to take will have an effect on national security. But first you must discover the secrets within the information. If the people behind this scheme should notice you they will go to any length to silence you. Proceed cautiously. (Disk) List $34.95 **SALE $22.95**



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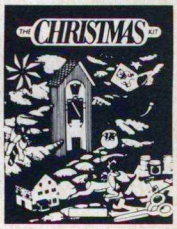

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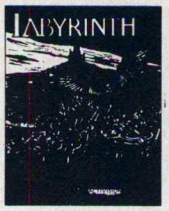

Shanghai — Shanghai is a game of strategy, memory and luck. It uses 144 Mahjongg tiles, arranged in a pile called "The Dragon". The cards are turned face down and you must pick two and hope they make a matching set. Only perfectly matching pairs may be removed. Tiles are stacked and constantly rearranged to provide exciting new contests each time. Play alone or with friends, for fun generated with Shanghai. (Disk) List $39.95 **SALE $23.95**

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reference labels in an entirely different source listing! When this occurs, the label being referenced is termed a global symbol. It is, therefore, possible to define a subroutine in one listing and reference that subroutine from a completely different source listing. The advantages of being able to do this should be obvious. If you are writing a program that contains thousands of lines of source code, you can break up your program into a set of smaller modules each of which can be written and debugged separately.

EDASM provides two pseudo-ops for specifying global symbols. The ENTRY pseudo-op is used for specifying those labels in the current listing which are to be accessible from other listings. The EXTRN pseudo-op is used for specifying those symbols which are being referenced in the current listing but which are defined (appear as labels) in some other listing.

Generating Relocatable Code

To generate relocatable object code all you have to do is begin your source listing with a REL pseudo-op. This will tell the assembler not to generate absolute code. (Normally a REL pseudo-op at the beginning should have been sufficient to specify relocatable code. Unfortunately, due to a minor design flaw in EDASM, the REL pseudo-op must be immediately followed by an

```
ORG  $1000
```

pseudo-op. Without the presence of an ORG pseudo-op, EDASM will not generate any object code at all.)

An Example

To illustrate these ideas, consider the case of a simple relocatable main program that calls a relocatable subroutine (named HOHUM) in a loop. The main program is:

```
        REL
        ORG     $1000
*
        EXTRN   HOHUM
*
LOOP    JSR     HOHUM
        JMP     LOOP
```

Next, let's look at relocatable subroutine HOHUM:

```
        REL
        ORG     $1000
*
        ENTRY   HOHUM
*
HOHUM   NOP
        RTS
```

Notice that the main program declares the label HOHUM to be an EXTRN, since the name HOHUM does not appear as a label anywhere in the main program's source listing. The listing for the subroutine contains the statement: ENTRY HOHUM. This declares the label HOHUM to be a global symbol so that it can be referenced from another source listing (in this case, the main program.)

The previous example declared the name of a subroutine (HOHUM) to be a global symbol. However, it is important to remember that a global symbol can be *any* label, even non-executable code (such as data tables).

Using the EDASM Linking Loader

Now let's see how we would use the EDASM Linking Loader to load in the previous little main program and subroutine HOHUM. (Let's assume that the relocatable object code for the main program is contained in a file named MAIN.OBJ0, and that the relocatable object code for the subroutine is contained in a file named HOHUM.OBJ0).

When we run the Linking Loader program, it will first identify itself and then it will issue the following prompt:

```
$1000 [MAIN]:
```

We are being asked for the name of the file containing the main program's relocatable object code. Furthermore, we are being told that it plans to load this code into memory location $1000. (The Linking Loader always initially defaults to loading into location $1000.) If we want our main program to be loaded somewhere other than $1000, all we have to do is type: $xxxx, where the four x's represent the hexadecimal address of where we want the main program to be loaded. In any event, when we are finally ready to load our main program, we simply type the name of the file in which it is contained, in this case: MAIN.OBJ0.

After the Linking Loader loads the file containing the main program it will issue another prompt consisting of a dollar sign, followed by a four digit hexadecimal number, followed by a name inside of a parenthesis, followed by a colon. The name inside of the parenthesis will be the name of one of the currently undefined global symbols (EXTRNs) that still need to be loaded. (In this case, we would see the name HOHUM inside the parenthesis.) In response to this prompt, simply type:

```
HOHUM.OBJ0.
```

At this point, there are no more undefined global symbols so the Linker Loader terminates and presents us with a memory map showing the exact hexadecimal location of every ENTRY name that has been loaded.

Subroutine Libraries

If you have designed your code well, you may find that some of the subroutines that you previously wrote for one application may be useful in other applications. Consequently, you might want to form a collection of these useful subroutines so that you can easily use them later on in other programs. Such a collection of relocatable subroutines can be thought of as constituting a subroutine library.

The ability to handle subroutine libraries is not unique to the EDASM Linking Loader. Most Linking Loaders provide a subroutine library capability of some form or another. What makes the EDASM Linking Loader truly unique is the elegantly simple way in which it handles the concept of subroutine libraries.

Most Linking Loader programs that have library capabilities require their libraries to consist of subroutines that have been physically packed together into one common file. Consequently, a separate library manager program is usually necessary for creating a subroutine library, or for inserting and deleting subroutines in an existing library. The EDASM Linking Loader, on the other hand, forms its libraries by "conceptually" grouping separate subroutine

modules, not by "physically" packing them together. An EDASM subroutine library is merely a directory (a text file) that lists the name of each ENTRY and specifies the name of the object file containing the relocatable code for that ENTRY. For example, to create a library directory consisting of three subroutines: PLOT, MUSIC, TALK, one would simply have to create the following text file:

```
PLOT:     PLOT.OBJ0
MUSIC:    MUSIC.OBJ0
TALK:     TALK.OBJ0
* END OF LIBRARY *
```

When such a text file (directory) is presented to the Linking Loader, the ENTRY names in the left-hand column are scanned. As each name is encountered, the Linking Loader asks: "Has this ENTRY name been referenced (via an EXTRN) by any of the modules that have already been loaded?" If so, (and if the ENTRY has not yet been loaded) the file specified in the right-hand column gets loaded. If not, it is ignored. If any undefined symbols still exist after a library has been searched, the Linking Loader will again issue its standard prompt with one of the remaining undefined EXTRNs inside the parenthesis.

Because the Linking Loader is interactive, there is no limit to the number of subroutine libraries that you can have. The only constraint is that each library must be completely contained on a single volume (i.e., diskette).

How Does Relocatable Code Work?

When you tell EDASM to generate a relocatable module (by using a REL pseudo-op at the beginning of your code), the resulting object file contains more than just machine code. Also included in the file are some additional tables of information. One of these tables indicates which of the machine code instructions in the module need to be modified when relocation occurs. For example, if one of the instructions in your source code is JMP XYZ, and XYZ is a label somewhere in the same module, the relocation table would indicate that the address portion of the JMP instruction needs to be modified so that the jump will occur to the proper memory location.

In addition, there is a table of ENTRYs and EXTRNs for the module. If a label was declared to be an ENTRY, its location in memory (after being loaded and relocated) is saved in an ENTRY defining table. Then, other modules that reference those ENTRYs (via EXTRN statements) can use this table to find the memory location of those ENTRYs. This is how the separate relocatable modules find each other in memory.

Fortunately, all of these operations take place transparently to the user. The entire operation of loading, relocating, and linking is automatically performed by the Linking Loader. For the most part, the user never needs to be concerned with the exact locations into which his modules are loaded. Everything just automatically takes care of itself.

Readers who are interested in obtaining more information about either EDASM or its Linking Loader should contact: Interactive Arts, 2715 Porter Street, Soquel, Ca 95073, Phone: (408) 475-7047.

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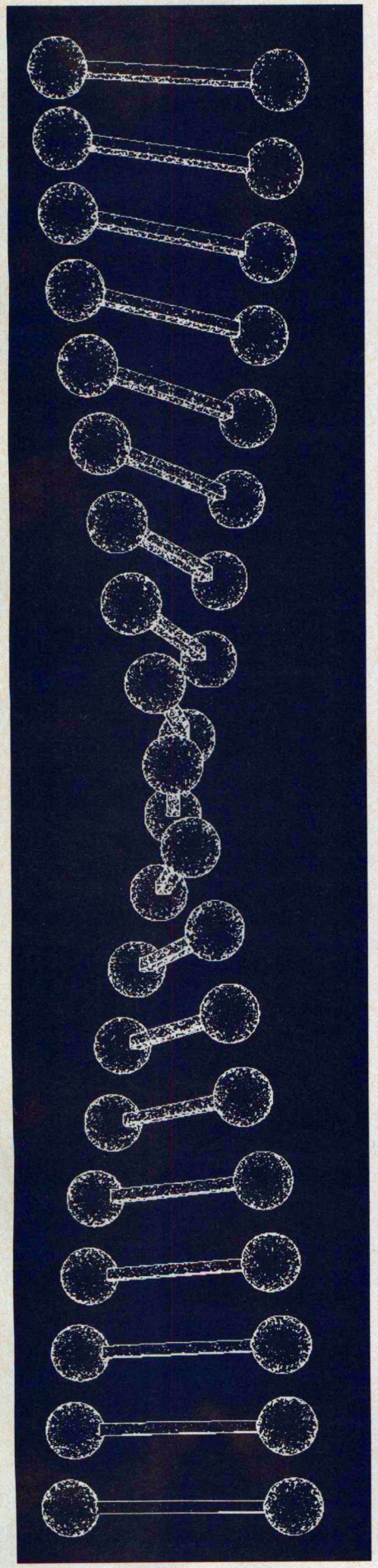

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SmallTalk Part 1

Michael & Lisa Storrie-Lombardi

Introduction

Object-Oriented Programming: After our excursion into the arcane realm of expert system development tools, welcome back to something we promised you months ago: the world of object-oriented programming. In memory of a powerful cartoon character from yesteryear we call it OOP for brevity. We had originally thought we would use one of the object-oriented Lisp, Logo, or forth languages. A variety of developers keep working furiously in each of these languages to adopt the object-oriented style to their particular dialect. At some point we shall still wade into some of these languages, but thanks to Apple Computer, Inc. and APDA (Apple Programmer's and Developer's Association) we now have available the landmark archetype of all OOP languages: **Smalltalk-80.**

Alan Kay: In 1970, with a physiologist and an artist/musician as parents, degrees in mathematics, molecular biology, and computer sciences, and a passion for music and esthetics, Dr. Alan Kay became one of the founders of the Learning Research Group at Xerox's Palo Alto Research Center (PARC). He received widespread popular press for his vision of the Dynabrook lap/ pocket computer and his insistence on the development of a truly user-friendly personal computer.

From the very first, Kay encouraged the PARC Learning Research Group to focus on a new concept: object-oriented programming. They called their inventive world Smalltalk and envisioned a combined programming and learning environment where both computer and human being could learn and grow. So dramatically have they succeeded, that Goldberg and Robson (1983) complained of having great difficulty getting Smalltalk to stand still long enough for them to write about it. The PARC group feels that they and the system have about a two to four year write / use / learn / revise cycle.

Smalltalk Background: Over a fifteen year period, work on Smalltalk has resulted in a vast, object-oriented programming world exhibiting a visual, graphics-based user interface, a small kernel of programming concepts, and a modular, extensible realm where you see no distinction between operating system and new input. The very success of the growth process has presented one problem for personal computer users: Smalltalk's size. When *BYTE* magazine produced their extensive introduction to Smalltalk-80 in 1981, no version of Smalltalk could run successfully on a microcomputer. At the present time, when APDA sends you your copy of Smalltalk-80 you will receive 5 400K single-sided disks. The source code alone fills 1.5 megabytes. In a very real sense, Smalltalk-80 may represent the one computer language whose growth has out-stripped hardware growth rates. Smalltalk has had to sit and wait for memory prices to come down (in both RAM and disk space) before it could enter the personal computer market. But that day has finally arrived. The IIGS, Macintosh, and MS-DOS machines all now have hardware characteristics sufficient to handle Smalltalk.

Smalltalk Core Concepts: Smalltalk exhibits three basic characteristics. First, it uses a very small number of core concepts, but they come to us in a quite novel terminology. Secondly, the graphical, interactive user environment has a number of novel characteristics even for the user well-acquainted with the Macintosh interface. Thirdly, it comes in one size only: enormous and growing. We shall spend the remainder of this column defining some of the basic Smalltalk vocabulary and providing you with an introductory look at the interface. The size issue we can only attack by devoting the next several columns to showing you how Smalltalk helps you conceptualize, produce, and recycle high level code.

Smalltalk Vocabulary

Objects: To get us started, Kaehler and Patterson in their article "A Small Taste of Smalltalk", provide a wonderful visual image of an object. Divide up all of your program code into data and routines. Tie a string between every piece of data and every routine that uses that particular data structure. Now juggle everything until you have minimized the total length of string. Now you will see each data structure at the center of a cluster of routines that use those data. If you can begin to see your problem in terms of these clusters of data and routines, the natural subdivisions of your programming task fall into sharp relief. In similar fashion, Goldberg and Robson talk of objects as private memories and their set of operations.

Message: A request for an object to perform one of its operations. The message names the operation desired, but it does not dictate how the object should carry out the operation. For example, a message might ask an object to add a number. The object might then look at the number, decide whether it looked like a fraction, small integer, or large integer, and then pick the most efficient way to go about the additive process. In other words, computational activity goes on only inside of objects. A message can invoke the activity but not control it. Conversely, the internal workings of an object cannot influence other objects. Only by message passage can one object activate another. This mutual protective process forms the cornerstone of modularity and reusability in object-oriented programming.

Receiver: The object receiving a message.

Interface: The set of messages to which an object can respond. You can only interact with an object through its interface.

Class and Instances: A class denotes the set of all objects representing the same type of system component. Each individual object in a class we call an instance of the class. A class describes both the form of private memories and ways to carry out operations for each member (instance) of the class.

Public Properties: The messages comprising the interface of an object. A class and its instances have the same public properties.

Private Properties: The set of instance variables comprising the private memories of an object plus the methods describing how to carry out the object's operations.

Programming in Smalltalk-80, one goes through a clear iteration sequence: Create a class ... create an instance of a class ... create ... the set of message exchanges for the objects in the class ... repeat, forming new classes and their instances where needed. The iteration becomes pleasantly recursive every time you use a newly formed class or instance to help you devise the next class and/or instance you need.

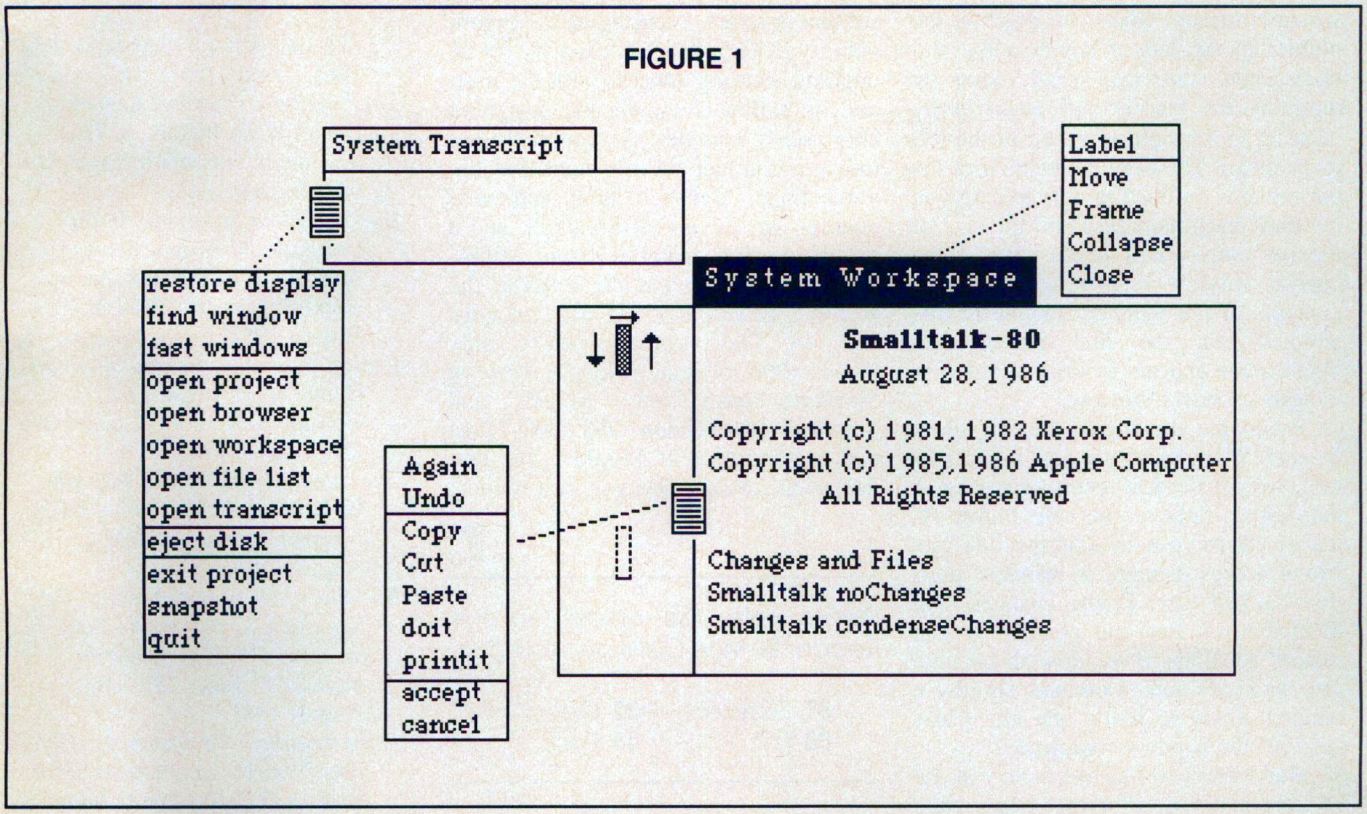
Smalltalk Interface

The Current System from APDA: APDA provides the complete Smalltalk-80 system for the Macintosh version 0.3. (All GS fans need to put in a plea Now!! We'll let the MS-DOS boys take care of themselves). It comes on 5 single-sided disks with a handy (vital) divide and join utility (DivJoin 1.0d9) for recombining the files in several different forms appropriate to your machine. You will find it difficult to get along with less than a 512K Mac and two 800K drives.

We run our system on a Mac Plus with a DataFrame 20 and plan to expand to 2 megs of RAM and a second DataFrame. The Smalltalk-80 interpreter takes up 56K, the source code in MacWrite format (which Smalltalk needs to have available) takes 1.47 megabytes, a full set of utilities accounts for 90K and you get another 50K of demos just for fun. The system comes with a 75 page manual in three-ring binder format. It has plenty of clearly presented information to get you up and running, but could use an index. Remember these beta versions available through APDA will most likely have markedly revised documentation when they go to final press, so send in lots of ideas as you read through this version. To get you joyfully engaged with Smalltalk-80 from the first, I would encourage you to get at least *A Taste of Smalltalk,* by Ted Kaehler and Dave Patterson. They provide an excellent step by step approach using what they call the "Rosetta Stone approach". They take you through the Tower of Hanoi recursive programming paradigm and show you how Lisp, Pascal, and Smalltalk handle the problem. A real must for further investigation of Smalltalk—*Smalltalk-80: The Language and Its Implementation,* by Adele Goldberg and David Robson.

Now let's look at some of the spe-

FIGURE 1



cifics of the Smalltalk interface as it appears in version 0.3 on the Macintosh (slight differences appear well documented in the 75 page user manual accompanying the APDA system). If you look at Figure 1, you will notice that the screen probably looks equally unfamiliar to you whether you live in a Macintosh world, an Apple II world, UNIX, or MS-DOS. In actual operation, each window appears naked with no apparent scroll bars or menu at the top of the screen. Menus and scroll bars arrive when you move the cursor to select positions relative to the active window. (In original Xerox format, the mouse required 3 different buttons to handle screen functions. You can use shift and control keys in concert with the single Mac button, but Apple has successfully worked out a relative position technique to have the single-button mouse perform all the functions available to its three-button cousin). We have made Figure 1 a composite of Smalltalk in the midst of several different functions. If we just had the cursor sitting in the middle of a window, you would see no menus and no scroll windows. As you move the mouse cursor to the left of any window, the scroll window pops out along the left margin. As the mouse moves on past the edge of the window, a small menu icon appears.

Moving from left to right through the different windows of Figure 1, we come first to System Transcript. Look at the small, unreadable icon on the left margin of the window. This tiny menu icon appeared when we moved the cursor past left window margin. We painted out the scroll bar on this window for clarity. Clicking and holding the mouse expands the menu to the display you see in the schematic. This technique leaves all of your viewing space for your programming input and output. It also allows for a greater variety and selectivity of menu choices so you have more tools available at the right time without cluttering up the window.

The **System Transcript** menu handles the global commands applying to the whole system. **Restore Display** restores correct screen appearance if you get in a jam. **Find Window** brings a desired window to the front. **Fast Windows** enable fast window redraw (It can overload in smaller RAM systems and dump you back to the old slow draw style familiar to a few of you with version 0.2. Once you close a few windows, you can re-enable fast windows). **Open Project** opens a new window for your next programming project. **Open Browser** opens a new **System Browser** window. Browser gets its name from the fact that Smalltalk-80 uses this window to let you "browse around" through the several levels or cluster of programming activity you need to create a program in Smalltalk. We shall spend most of next column in this window.

Open Workspace opens a new workspace for you to type in text and then ask Smalltalk to run it . **Open File Lists** lets you access the set of files currently available to you. **Open Transcript** gives you a window for communicating with Smalltalk about the program you entered and ran in the Workspace. You can tell Smalltalk what to do with the code and Smalltalk can inform you of success and failure. **Eject Disk** and **Exit Projects** seem obvious. **Snapshot** saves the current state of the system to disk so you can open up right where you left off next time (shades of Lisa!!!!). **Quit** takes you out of Smalltalk but will always query you about taking a snapshot.

Moving to the System Workspace window in Figure 1—think of this as a text and programming editor. In the window's menu, **Again** repeats the last paste operation. **Undo**, **Copy, Cut**, and **Paste** mimic the Macintosh conventions. **Doit** means treat the selected text as Smalltalk code and evaluate it. **Printit** tells Smalltalk to treat the selected text as code and run it, inserting the results right after the text. **Accept** tells Smalltalk to compile, link, and load the method or class selection in the workspace. **Cancel** deletes all text entered since the last **Accept** command.

Just to the right of the workspace window, you will see a grey bar that serves as the scroll bar. This scroll bar

window appears when you position the pointer to the left of any window and click once. You can scroll either by dragging the bar up and down or by clicking to the right to go up or the left to go down. The original location of the bar remains outlined in dots to help you get back to ground zero and the size of the bar corresponds to the size of the current window relative to the entire contents of the window. Notice in this window that the title tab **System Workspace** appears in inverse video to indicate an active window.

By double clicking on the title tab of System Workspace (or any other title tab), we get the last menu appearing in the upper right corner of Figure 1. **Label** allows you to edit the title tab. **Move** allows changes in window position but not size. Frame changes both the window's size and position or can restore a collapsed window to original size and position. **Collapse** shrinks a window down to just a title tab. **Close** destroys the window completely.

Our editors tell us we have run out of time and space for this issue. Next month we shall leap into the Browser and start setting up a series of demonstration programs focusing on the expandability of Smalltalk, its capacity for an ongoing learning process with the user, and its ability to handle the design of enormously complex systems with getting programmer or user confused beyond hope. Between now and next column, get a copy of Smalltalk and a bit of reading material from APDA. Thanks to Apple and the folks at the APDA, *Smalltalk-80: The Language and Its Implementation* costs only $31.95 (60% of retail price), *A Taste of Smalltalk* costs only $13.95, and ***Smalltalk-80 version 0.3*** will cost you a grand total of $50.00 ... the best deal of the decade. See you next round.

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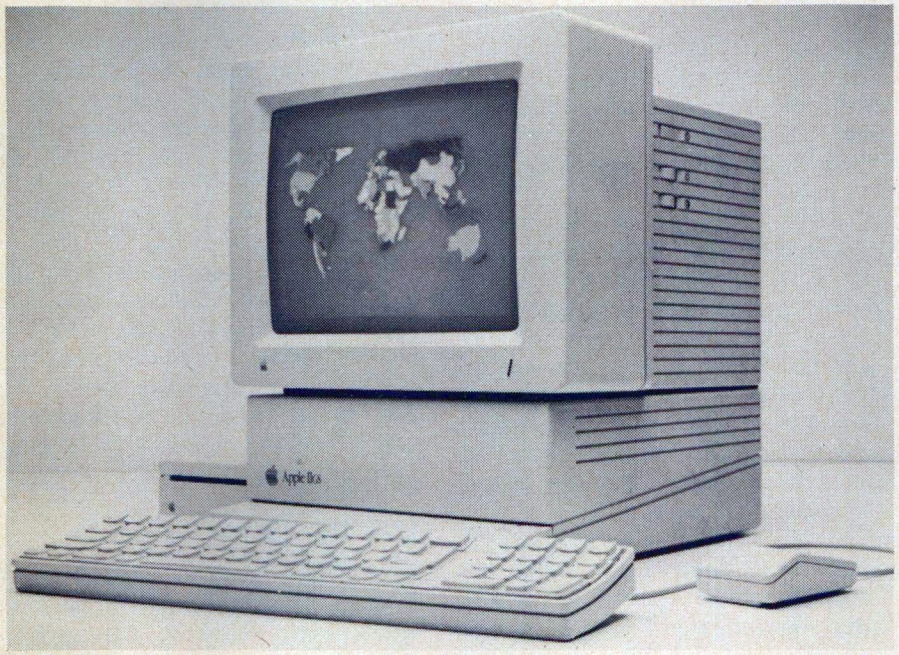

Keith Nemitz

Friday, October 24 Apple organized a series of technical seminars to explain their design and implementation of the Apple IIGS. Each session was moderated by the manager of each team, and the panelists were the engineers themselves. Each engineer was given an opportunity to present their contribution to the machine and plenty of time was reserved for questions and answers. Several times the engineers were called upon by the audience to explain their decisions.

In some cases the engineer was limited by the overall design. In others, he ably defended his decision, and often the audience showed full support for the reasons. The vast majority of questions echoed the great need of developers to find out all they could about this new computer.

Unlike the day before, full of hype, the second day was an excellent example of a computer company spilling their guts to 3rd party developers. I suspect a lot more respect was gained Friday than had been the first day.

Fitting the Features into 64K

Fern Bachman moderated the first session. He set a good pace at the beginning by saying that the firmware development had begun nearly at the same time the hardware was being developed. They had about two years time to fit all the new features of the Apple IIGS into 64K of ROM. Later, the firmware group succeeded in a coup by getting management to approve 128K of ROM space. But before the dust had settled, the group realized that in order to fit everything into the GS, 128K of ROM could easily be doubled. Unfortunately, they had to put much of the operating system onto disk. What they did fit into the ROMs is pretty amazing.

Programming the 65816

Before jumping into the firmware specifics, Jim Jatczynski was introduced to speak about how one does program a 65816. "Very carefully." Jim quipped. The 65816 is a bizarre hybrid of an 8 bit and 16 bit microprocessor. Internally, it has 16 bit registers with an 8 bit page register for address purposes. There are 24 address lines coming out of the chip which can access 16 megabytes of memory. The data bus is only 8 bits wide so 16 bit data operations must double up on the bus.

This is similar to the 8088 in the IBM pc, but even though the GS runs at half the clock speed of an IBM, the efficiency of the 65816's instruction set lets it run programs almost twice as fast. Compared to Apple II's, programs that take full advantage of this microprocessor can run 4 times faster.

The Memory Map

Fern took the stand again and presented a quick discussion of the memory map in the GS. Because the 65816 addresses memory in 64K segments called banks, memory is shown as a series of banks. There is 128K of ROM and 256K of RAM in the Apple IIGS. The 128K of ROM sits in banks FE and FF, and expansion ROM can fill banks from F0 to FD. The first two RAM banks, 00 and 01, correspond to the 128K of memory in the Apple IIe and

IIc computers. When the GS is run in emulation mode, this is the only memory that programs will be able to use.

The two bank pairs of RAM which are built on the motherboard are located at 00-01 and E0-E1. The first pair is called fast RAM and the second pair slow RAM.

In order to be compatible with earlier Apple II's, the Mega II chip which provides the Apple II emulation runs at a maximum of 1 megahertz. It addresses E0 and E1, which are limited to the slower clock speed. Banks 00 and 01, as well as any memory expansion, can run at nearly 2.8 megahertz. When Apple II emulation is active, Banks 00 and 01 are mapped onto parts of banks E0 and E1. It's like sewing a patchwork quilt onto virgin linen sheets.

The original display organization is mapped into the E1 display memory and the I/O segment from C000 to CFFF is mapped into the corresponding locations in bank E1. The purpose behind all this confusion is simplicity. If you ignore banks E0 and E1, all the confusion dies.

Most developers will be programming the GS in native mode because this is where the power of the machine truly lies. In native mode, Banks 00 and 01 become nearly clean slates. You can address the screen directly from Bank E1 so bank 00 address space 0000 to BFFF is completely clean. C000 to CFFF is still mapped into the I/O slots, unfortunately, but this allows you to drive existing peripheral cards from your GS native mode programs. D000 to DFFF is also clean.

The direct-page locations, and the stack must reside in Bank 00, and are used by the operating system. Expansion RAM begins from bank 02 and can fill up to bank 7F. That's 126 times the amount of RAM in the Apple IIe! For the most part, the GS has really cleaned up the Apple II.

You can tell there is a lot of love for the old Apple II monitor. It is one advantage the Apple II has over the Macintosh. When Fern Bachman went on to describe the changes in the monitor, a quiet smile or nod of the head was evoked from many a developer. Most of them grew up on the darn little thing. It isn't so little anymore. The monitor command sheet is filled with 52 different commands. It has been upgraded to handle all the new instructions of the 65816. It can address every bank in memory, do 32 bit hex math, change emulation modes, disassemble, step and trace, provide keyboard buffering, support either 40 or 80 column text, and still retain the Apple IIe entry points. Even the old mini-assembler has been revised and included in ROM, and a single fixed checksum exists for the entire ROM.

The Control Panel

The last thing that Fern showed off was the new control panel. This is similar to the Macintosh's desk accessory, but provides a hook into every conceivable setting of the Apple IIGS. It allows you to change the display mode, and colors of the background, foreground, and border. You may set the volume of the sound port and pitch of system beep (which has been changed to a boink). The system speed is changeable to either 1 megahertz or 2.8 megahertz, called normal mode and fast mode. Fern commented that it wasn't very respectful to call the speed of the Apple IIe, slow.

The clock-calendar can be set from the control panel, the clock display being able to show 12 or 24 hour time. Configuration of the slots is very important because the Apple IIGS has a built-in equivalent for almost every standard card that is used in an Apple. From the control panel you can tell the computer whether you want the default built-in card to be used, or a card of your own.

Another good example involves communication cards. Most modem programs do not know how to use the new serial chip on the Apple IIGS. The 8035 serial communications controller is mapped into slot 1 and slot 2 of the Apple IIGS. If you disable the default slot 2 modem port and plug in your own modem card or serial card, you may use your existing Apple II communication program.

A very nice feature of the control panel lets you select which slot you want your Apple to boot from. This way you don't have to put your hard disk card in slot seven to boot it ahead of your floppy drives. You may also choose to scan the slots like the GS' predecessors.

The control panel can configure both channels of the serial chip. It may be set for either a printer or modem. You may set the line length, CR filter, linefeed, local echo, buffer, baud rate, parity, data and stop, and even the type of handshake used.

Other functions of the control panel configure the display language, the keyboard language (from a choice of 6 European countries), the repeat speed and repeat delay of the keys, mouse double-click time and tracking speed, and set the cursor flash speed, to name just a few. Even the RAM disk is configurable.

The Desktop Bus

Peter Baum stood next. He talked about the Apple IIGS's new input device interface called Apple Desktop Bus. The mouse on the GS is attached to the keyboard. At first glance, you might assume the team had burned the candle at both ends a bit too often. They probably did stay up late, 18 hour work sessions were common. But, upon closer examination, attaching the mouse to the keyboard was pure genius.

With the old Apple II's, anytime anybody invented a new input device, like a light pen, or tablet or the ridiculous 'input glove' you had to waste a slot to use it. Apple's new desktop bus interface is a generic input interface that allows up to 15 different devices to be chained together, all plugging into the same port as the keyboard.

Imagine the possibilities. Two keyboard input for teacher-student interactive sessions. An 88 key music keyboard for musical computing. Five joystick games for the whole family. It is this type of freedom for developers that will generate better and more imaginative programs.

Use the Entry Points

Next, Rich Williams spoke about the interrupt control firmware. His first words were, "Use the entry points." Apple has gone to a lot of trouble to make their new computer please everybody all the time. A developer who ignores their guidelines will eventually find that his software is incompatible with future versions of the Apple II.

With the interrupt firmware, it becomes especially important to follow not only the allowed entry points, but interrupt specific rules as well. The first rule is *"Leave them on."* The AppleTalk network firmware requires a continuous heartbeat of interrupts and if they are neglected, errors will occur on the network. And, the original style desk accessories cannot be accessed with an Control-Open Apple-ESC unless interrupts are enabled.

The second rule is, *"Do not disable interrupts for longer than a second."* Application interrupts are allowed, but the same reasons for rule one apply. Again, Appletalk is interrupt critical.

The third rule is not very obvious. *"Do not use 6502 emulation mode outside of bank 00."* The problem is that

when interrupts occur while the processor is emulating the 6502, they will not find their proper handler code unless the current memory bank is 00. Without the proper care, a system crash will usually occur.

Lastly, Apple warned its developers that the interrupt handlers are not reentrant. When an interrupt occurs, the firmware handler gets executed which disables interrupts for its execution period. If during its execution, interrupts are reenabled and the handler is preempted by another interrupt to itself, then the original call cannot be resumed, and the system will die. Interrupts are tricky things and should not be dealt with lightly. It is up to the developers to provide the necessary buffering of interrupt parameters to make reentrant interrupts possible.

Serial Ports

The next issue was serial ports. Michael Askins began his short explanation of the serial firmware by plunking down eight pages on the overhead viewer. I mentioned in last month's article that the Apple IIGS contains a serial communications chip which has never before been seen on a Apple II computer. It is the same chip that Macintosh uses.

A programmer can use the serial device as if it were a Super Serial Card. BASIC users should have no trouble with using PR#, IN#, COUT, and CIN. Apple Pascal users will find the firmware supports version 1.1 protocols, which the SSC and the IIc have, using READ, WRITE, STATUS, and the Extended Interface.

Michael Askin did stress that the BASIC interface ($Cn00) is for BASIC compatibility only. The Pascal interface is the interface of choice for all new applications. (One needen't be restricted to Pascal of course.) The GS supports serial Printers, and Modems. Fifteen different baud rates are available, from 50 bps to 19200 bps, as is selectable parity and data formats. Handshaking is completely configurable. DSR input, DTR output, and DCD general purpose input types are allowed. There even exists a dumb terminal emulator.

All aspects of the serial firmware are configurable from the control panel, or by an application. Applications alter the serial formats and abilities through the use of embedded command strings, and extended calls to the firmware. There are 17 basic command strings. These are sent out as if they were actual serial data, but are picked up by the firmware and interpreted instead of being sent out the port. One command will turn off the command filter. Programmers can turn the command filter back on through the use of a direct subroutine call.

There are nine extended calls for buffer control, and nine for serial hardware and mode configuration. Their explanation would make an article in themselves, and Michael did not elaborate on them due to his time constraint. He did say that the GetSCC and SetSCC calls are very hardware specific. Developers should be aware for product compatibility's sake that these calls will be the hardest to emulate if the hardware should change again.

Some Special Features

One special feature that the Apple IIGS

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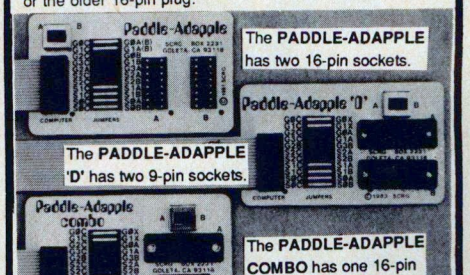
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provides is full I/O buffering. This buffering of data passing through the serial chip is completely transparent to the application, and is interrupt driven. Again, don't turn off the interrupts. Your application may define the buffers, which may be any place in memory and of any size. This buffering is controlled by nine extended calls.

The second ability of the serial firmware allows printing in the background. All that an application has to do to is set up a background print buffer and supply a routine to the firmware which will recharge the buffer when it gets emptied. Here, the GS staff has a six month jump on the Macintosh, which does not currently support background operations.

Another item mentioned was Appletalk, which Rick Hoiberg discussed briefly. Because the serial chip is the same one used in the Macintosh, all a GS owner has to do is purchase the $50 connector and he can speak to Mac, LaserWriter, FileServer, and any other device on a network (even an IBM-PC, which requires a $700 connector)!

An exciting piece of GS code was mentioned here. On their 'off' work hours (which occur in the fourth dimension for Apple employees), some of the firmware crew wrote a program that gets downloaded to the LaserWriter. It emulates an Apple ImageWriter dot matrix printer. Now at first thought, a programmer might ask why one would brain-damage the LaserWriter in such a way, but it should quickly dawn on the user that all his old Apple II software, like AppleWorks, or hardware like a screen dump printer card, can produce the high quality print that is possible with the LaserWriter. Pica output is converted into Helvetica and Elite is printed as Times-Roman. Even bolding and underlining is supported, and graphic dumps are smoothed! It was an impressive concept.

A Repeated Warning

Michael ended this talk by repeating the warnings that Apple needs to impress upon its developers. *"Use the firmware!"* He said. "We wrote it as efficiently as is possible, but if you must go around it, then you should at least provide a firmware equivalent which will work with future generations of the Apple II."

He also warned not to use the screen holes, saying that it was no longer necessary because the line length and Zap mode are now controlled by calls to the firmware. And, he mentioned that in their examination of vendor's software they found that some programmers would make calls to $Cn00 just to output a single character. That is a big no-no with the new firmware. It is very expensive, speed-wise because it is the address of the entire serial initialization routine and no longer has the side effect of passing a character out the port.

Disk Drive Support

The last speaker from the firmware group, Ray Montagne, discussed disk drive support. First of all, Apple considers a port different from a slot. Using the GS as an example, the various peripheral connectors at the back of the case, such as ADB, sound, video, serial, are considered ports. Slots are the card plug connectors sticking up from the motherboard. Ray mentioned this because in an Apple IIGS, it is not obvious that disk drives coorespond to a specific slot.

Most GS owners will attach their disk drives to SmartPort, but depending upon the drive they will be logically assigned to a slot. 5-1/4" drives are assigned to slot 6, and 3-1/2" drives are assigned to slot 5. The disk drive firmware takes up the ROM space allocated to these two slots. Slot 5 contains the SmartPort driver, and slot 6 holds the disk II boot driver.

If you turn off the disk drive firmware from the control panel, you may use your own controller cards and old style drives. Note that the connectors for the UniDisk controller and SmartPort are the same. Apple has a new 3-1/2" drive called the Appledisk 3.5, which is compatible with both the GS and the Macintosh, but the older UniDisk will work from SmartPort. Macintosh's current 800K drive will not work, as well as 3rd party vendor 800K Macintosh drives.I think the only one that works better is Apple's own 3.5 drive.

5-1/4" drives that will work on SmartPort are Disk IIc, UniDisk 5-1/4, and DuoDisk. Apple recommends that no more than four drives be hooked to SmartPort at one time, but the firmware team admitted that six seemed to work okay.

From a programmer's point of view, SmartPort is an intelligent device driver, which will direct data packets from an external device to a known buffer. Data may be sent to specific devices for either storage purposes or control, and is sent in a standard format used by SmartPort. Intelligent devices are assigned a logical address on the port, and they are expected to convert the data packet format into something it can use. Unintelligent devices are controlled by SmartPort, and device drivers which are not aware of the SmartPort data packets have your call parameters passed to them. Ray did warn, and please take note, that these disk port drivers may only be accessed in emulation mode.

Apple did not stop at controlling just disk drives. SmartPort also controls the RAM disk, and a possible ROM disk. Imagine booting up off of your memory card! Future support in the next version of ProDOS 16 will allow booting off of AppleTalk. And several guarded comments were made about CD-ROMs and laser disks.

As you can see, a lot of information can be distributed in only three hours' time. Developer's left with a positive feeling. They had acquired the informaiton they came for, and were pleased with the presentation. We all looked forward to the remaining seminars, which I shall speak about in future installments.

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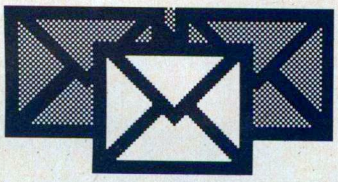

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Meeting Minutes

Dr. Alan Kay at the Pacific Science Center

Keith Nemitz

Our guest speaker at the November general meeting was Dr. Alan Kay, an Apple Fellow from Apple Computer, Inc. He gave a warm and enlightening presentation of past and current research into the fields of computer interfaces and the learning process. His discussion and video tapes lasted two hours, but for us in the crowd, the lecture ended all too soon.

Historical Background

Alan Kay summarized his work at the Palo Alto Research Center and explained the historical programming efforts which led to its formation. He showed slides of his nomination for the first personal computer, called the Link. Its main logic unit, interface box, display, and storage devices all fit on a large table.

It had a keyboard, a video screen, and virtual memory tape drives. It even had a full on-line help system. Made in 1962, the Link's primary task was collecting and manipulating medical instrument data. It is still a viable machine for its purpose today, and almost half of the 2000 made are still in use today. DEC computers have their roots in the Link project.

Ivan Sutherland (co-founder of Evans and Sutherland), also at Link labs, developed computer graphics and SketchPad that same year. SketchPad was the first object-oriented drawing program, and actually founded the concept of object-oriented programming, due to its abilities of property inheritance and object instantiation. Dr. Kay sees a direct link between SketchPad and the Smalltalk development environment.

In 1964, Doug Inglebar developed a system which imagined the computer user to be at the controls of an information vehicle. In his system he investigated the types of controls a user might use to operate his computer. One of these controls was the mouse.

The Rand Corporation funded a project called JOS in 1968. Here the emphasis was on creating a user interface in an existing programming system. In the interface, there were no commands, except the examples a user would put in the machine.

If you wanted a box, you drew something like a box. If you wanted text, you scribbled the text you wanted and let the computer make your characters nice and neat. Alan mentioned that he often showed that particular video tape to his fellow researchers at PARC (Palo Alto Research Center) in order to show them what they were trying to accomplish.

At PARC, Kay's project was to be aimed at future computer users, "What would these people need from computers? And, what would be required of computers to facilitate these needs?

Alan Kay had coined the term *personal computer* by which he meant a device that was as neglected as a pencil until it was needed. "A personal computer has to 'go with you'." If a grocery shopper doesn't enter his list on his personal computer and then take it to the store so he can check off each item as he gets it, then it is not a personal computer. Obviously, when designing a computer, there has to be an understanding of people.

Children and Smalltalk

Children were chosen to take part in this study. They would use the Alto computer, which was built by Kay's research team, and Smalltalk which was developed to be used with this machine.

The Alto was a very simple computer which incorporated a bit-mapped screen, a hard disk storage subsystem and a few A/D and D/A converters. It had a completely closed architecture, which was made up for by a tremendously fast central processor (6 MIPS). Anything that usually requires a interface bus, could be implemented in software, such as a music synthisizer, or bit plane screen animation.

The children involved developed programs and generally used the computers for whatever purpose they could think of. They were encouraged to be as creative as possible and try to accomplish their goal as soon as they felt ready.

Some of them produced college graduate level programs after only three months of experience with the Smalltalk environment. Alan Kay mentioned repeatedly that modern personal computers have yet to reach the level of sophistication available 20 years ago.

He explained that personal computers are not yet powerful enough to implement those sophistications. However, he said the next generation of 68020 Macintoshes will have that capability.

The Three Types of Learning

Alan's next topic of discussion involved the three types of learning that humans are aquainted with: Symbolic, visualization, and reflex/motor. In other words, we learn by communicating, watching, and doing. Our current school system places a large emphasis on symbolic learning, although it has been proven to be the weakest mode of learning.

Dr. Kay cited two examples which

demonstrate some of the ways we learn. The first example was a video tape done recently by CBS news. It covered how an overweight middle-aged woman learned to play tennis in 20 minutes, the instruction covering forehand and backhand swings, and the serve. It illustrated that she only needed to mimic the instructor's movements to play the game. It was easy as long as she didn't contemplae her actions. Her body could learn the game so much easier by just doing it than she could have by thinking about all the details involved.

The second example was a study done with the logo turtle and three children; one age five, one age 10, and one age 15. Here each child was in a particular stage of learning development.

The youngest child learned best by touching and doing, the middle child learned by watching other's examples, and the oldest child was well into reading and studying. Each child was able to play with a mechanical turtle which could draw on a piece of paper. They were all given the same assignment. Make the turtle draw a circle.

The first boy told the turtle to move a little and turn a little, the way he would if he had walked out a circle with his body. The second boy noticed that if the turtle started at the center of a circle, which he visualized on the paper, and then moved out to draw a series of points around the center, the circle would be drawn. The third boy was unable to get the turtle to draw a circle. The controls would not accept x2+y2=r.

Dr. Kay ended his presentation with examples of his current project, funded by Apple Computer. The project is called Vivarium, and once again school children are the focus. This time the children will not only program a computer, but will create simulated independent agents living in an underwater environment. They were given a series of parameters about each creature. It will live and interact with the other creatures in the simulated world.

Once again, the most powerful computers available will be used to support the real-time animated graphics necessary to display the world from each creature's point of view for every creature in the simulation as well as an over-all view of the underwater world. Alan Kay said that the project's ultimate goal would be to have a human, outside the vivarium, tap on its imaginary glass container and have all the creatures scatter in fright.

Although this has been a very limited report on Alan Kay's presentation, I would like to add that if you ever get a chance to hear him, by all means do so. Those of us were were lucky to catch him this time, look forward to hearing him again.

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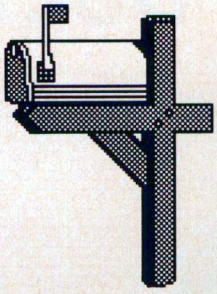


Readers' Forum

Observing the GS

I have had my IIGS (limited Edition, signed "Woz") since November 7, and thoughtI would send you a few observations:

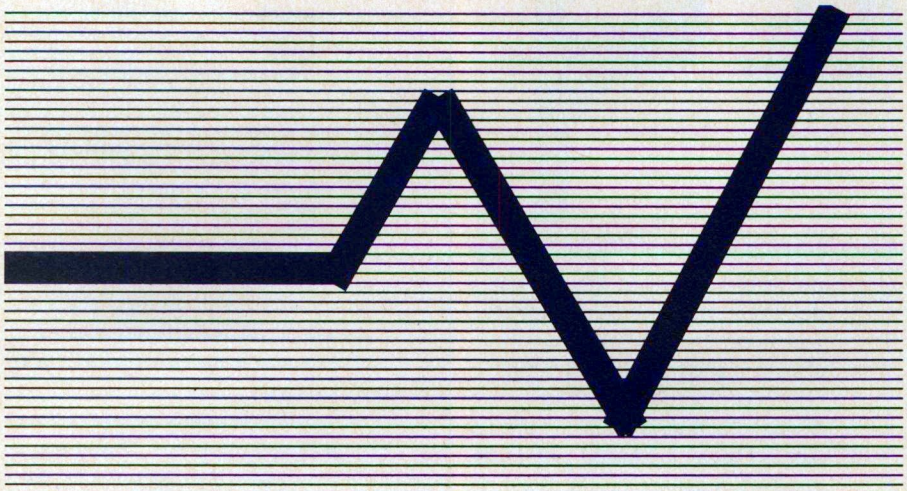
1. The difference in the cost of the IIGS CPU with DeskTop Mouse and IIGS System Disk ($999.00) and the IIGS upgrade for the enhanced IIe ($499.00) plus the cost of the DeskTop Mouse and IIgs System Disk was not worth giving up my IIe. Apple's $250.00 rebate on an Image-Writer II made investing in a second system even more reasonable. (The documentation needed for rebates--original dated invoice with dealer signature and number, and bar codes from the product cartons--seems geared to slowing down the gray market.)
2. Although the IIGS Owner's Guide said my Apple dealer could upgrade ProDOS on my application disks to version 1.2, my dealer did know the procedure. Copying the file System.Disk/System/P8 from the IIGS System Disk to XXXX/ProDos (where XXXX is the volume name of my application disk) worked for my ProDOS disks (even copy protected ones). Almost any copy utility would make the transfer, but I found the Copy a File utility on the IIGS DeskTop very easy to use. Having ProDOS8 on my application disks lets me access the IIGS Control Panel, which is helpful especially when I need to change the RGB display from color to monochrome or back. (The Catalyst 3.0 DeskTop iis really blurred when the IIGS is configured for color on an RGB monitor, so being able to interrupt Catalyst to change the display to monochrome is great; and when I use Catalyst to choose a program like Beagle Graphics, I can change the display back to color.)
3. Apple Pascal 1.3 based programs can be a nuisance on the IIGS. MECA's Managing Your Money, for example, recognizes memory storage devices (disks or cards) only in slots 4,5, and 6, and works best with two 3.5 drives and a memory expansion card. If I configure part of the IIGS Memory Expansion Card as a /RAM disk,the IIGS makes it appear to be in slot 5, Drive 2, and moves my second 3.5 drive to Slot 2, where Apple Pascal 1.3 cannot find it. To let both 3.5 drives appear in Slot 5, I have to set the IIGS RAM size at zero (maximum and minimum), and put my Apple II (not GS) Memory Expansion Card in Slot 4 or 6, which makes it useless for most other programs. (If I use the Memory Expansion Card in Slot 4, the DeskTop Mouse is disabled. If I use the card in slot 6, my 5.25 drives are disabled) The Apple UniDisk 3.5 ROM is smarter than the Apple 3.5 Disk Drive since the former is compatible with the IIe and IIc, as well as the IIGS and Macintosh, while the Apple 3.5 Disk Drive does not work with the IIe and IIc.
4. Catalyst 3.0 will recognize a IIGS Memory Expansion Card configured as /RAM as a disk on line, but will not automatically download applications to it. However, it will download applications to an Apple II Memory Expansion Card in any slot.
5. Some applications recognize the old Apple Mouse, but not the new Apple DeskTop Mouse. I put my old Apple Mouse in slot 4, and configured the IIGS for "your Card" in slot 4 for applications like Electronic Arts' Music Construction Set. (When you read this, Deluxe Music Construction Set should be out and I can put my Apple Mouse and Mockinboard back in my IIe).
6. AppleWorks 1.3 can recognize the IIGS Memory Card /RAM and the Apple II Memory Card /RAM, but the maximum desktop stays at 55K. AppleWorks 1.3 could not find the current date on the IIGS, nor would it time/date stamp saved files, until I upgraded weeks ago (October 1), and understand Apple has recently begun shipping to upgrade customers.
7. The suggested retail price of the Apple IIGS Memory Expansion Card with 256K ($129.00) is lower than most of the third party cards. I saved even more by ordering more sets of 256K bit chips from other sources and installing them myself.
8. Sony speakers designed for the Walkman work fine with the IIGS and are less than half the suggestsed retail price of the Bose Roommate speakers. The speakers I got for my IIGS are model APM-090. I think this model has been discontinued, but Sony manufactures other similar speakers with self-contained amplifiers.
9. The IIGS hardware meets the high standards expected from Apple, and the prices are competitive. Most of the documentation matches the Apple standards I have grown accustomed to, although my DeskTop System Software User's Guide had double sets of pp. iii-4 and 21-28, and was missing pp. 5-20. The IIGS System Disk is designed well, but Your Apple Tour of the Apple IIGS is the most unprofessional product Apple has produceed in years.

Sam L. Pemberton, Jr.

Please rate this article on the Reader Service Card by circling:

110 Excellent **111** Good
112 Fair **113** Poor

A.P.P.L.E. Doctor



Bruce F. Field

ANOTHER SOLUTION

Recently I had a question about eliminating carriage returns from files uploaded to the Apple from a Radio Shack M100. My original solution, was to use the Ctrl-F function in Apple Writer to globally replace the carriage returns. I also reported Chris Arndt said that when using the Radio Shack Telecom program to transfer programs, that the "width?" prompt be answered with only a carriage return (no number). George Katzenberger has written with another solution.

"The secret is that the M100's RS-232 port and built-in modem can be accessed from within the TEXT program. Here's how it works. With the file you desire to send loaded into the TEXT program, press F3 and at the 'Save to:' prompt, type COM:87N1E. The 'COM:' command selects the RS-232 port, and the M100 users will recognize the string that follows as a parameter setting string, in this case, 9600 baud, 7 bit word length, no parity, 1 stop bit, XON enabled. The user will have to set the parameter string to match his equipment and software. The M100 modem can be used from TEXT as well, the technique is the same except that at 'Save to:' type 'MDM:M7N1E'. Using the modem limits transfers to 300 baud."

Thanks George, I'm sure our readers will find that helpful.

A FOILED MONITOR

Q. *I recently bought an Apple color monitor for my IIc and an unusual problem came up. Certain disks would not boot. I took the IIc and the disks to my dealer's repair shop and it worked perfectly! It was suggested that I plug in the peripherals one at a time in order to isolate the problem. The color monitor was the problem. The fix was to make a shield of household aluminum foil and cover the top of the computer. It would appear that the color monitor should be shielded better by Apple. Is there a better looking fix for this problem?*

A. You are not alone, this same problem has been discovered in the past with other monitors. Agreed, the monitor manufacturers should shield the monitors better, but you may have an especially noisy one, or your IIc may be particularly sensitive to noise. One solution is to move the monitor further away from the IIc. A few inches can sometimes make enough of a difference to eliminate the problem. The only other solution I know of is to place the foil shield inside the case of the monitor or the computer. This can be risky as you must put some insulating material (mylar film?) between the foil and the circuitry in the instrument so it doesn't short anything. The foil should be electrically connected to the power line ground but nothing else. Perhaps you can make or buy a decorative metal monitor stand that will also shield the computer.

A MALFUNCTIONING RAM CHIP

Q. *I have a very intermittent hardware problem with my Apple II+ that has been driving me up a tree. The problem only happens when the room is warm and the computer has been on for a few hours. The "G" execute command in the monitor will not execute. For example, 3D0G will cause the pointer to move to $03D0 at which point the computer stops in the monitor. The jump instructions are correct. BASIC programs execute normally. I have peeked all F8 ROM memory locations and stored them on a file during normal operation and during the problem. A comparison of the values indicate all F8 memory locations read normally and compare to the pre-problem condition thereby eliminating the F8 ROM. The failure of the "G" command will happen at any memory location. The routine at a memory location will execute normally if called from BASIC with the CALL command.*

A. Assuming you have done all the usual Apple troubleshooting things, like pushing all the chips down in the sockets, and removing and replacing all the peripheral cards, my best guess is that you have a malfunctioning RAM chip. It's possible that the "G" command uses a memory location that occasionally fails, or fails when accessed after another particular location. I had a memory chip once that worked fine 99% of the time but with one, and only one, AppleSoft program it replaced one of the characters in the program with an ampersand whenever I saved the program to disk. I could edit the bad line to change it back and run the program fine, but as soon as I saved it the ampersand was back! Try running a RAM memory test program to see if anything turns up. You could also swap pairs of RAM chips (two at a time) to see if the problem changes. This is easier in a //e with only eight chips rather than the 24 in the II+, but, if you are really desperate...

Using the same convoluted logic I wouldn't necessarily rule out problems in F8 ROM or the other ROM chips. I might believe that accessing certain combinations of address locations could

produce problems. One other test you might try is to *not* boot DOS on power up. If you then get in the Monitor and use only Monitor commands you can determine exactly what RAM and ROM memory locations you are using. DOS won't be doing things you are unaware of, and AppleSoft will also be out of the picture, so you will be using only the F8 ROM, the zero and first page of RAM and whatever other locations you specify.

VALUES OF NUMELS

Q. *What are the valid values for the variable "NUMELS" in the Fast Garbage Collection Routine that appeared in* Call -A.P.P.L.E. *magazine and in* Call -A.P.P.L.E. In Depth, Vol. 1, "All About AppleSoft"? *I can't get any value greater than 64 to work.*

A. For the uninitiated, Fast Garbage Collection (FGC) is a machine language program written by Randy Wigginton that can be called from an AppleSoft program to clear unused strings from memory. If left to it's own devices, AppleSoft will do this whenever memory gets full, but the process can take several minutes. During this time the computer appears to have died, it won't respond to the keyboard or print anything on the screen. FGC will perform the same function in a few seconds or less. NUMELS is a variable that controls the number of strings that are processed on each pass through FGC. The value of NUMELS used is a tradeoff between speed and the amount of storage the program requires to do the processing.

As printed in *"All About Applesoft"*, NUMELS is set to 16. However Randy says it can be increased to 32, 64, or 128. In fact it is limited to a maximum of 64 because of two conditional branches in the program. Near the end of the program ($914A) register X is set to NUMELS*2 - 1. This register is used as a loop counter and is decremented at $9191 and tested for a positive value at $9192. Normally it starts as a positive value and is decremented through zero and becomes negative at which time the loop is terminated. If NUMELS is set to a value greater than 64, NUMELS*2 - 1 is interpreted as a negative number and the loop terminates incorrectly after only one pass. The same situation happens at $9194 and $919E, $919F.

INCOMPATIBLE METHODS

Q. *I run a IIe driving a Hewlett Packard 7475A plotter via a Super Serial Card. The sad fact is that there seems to be very little software available for such a combination as the machine driver to the plotter must be quite complicated. The question I have is, do you know of any driver routine that is available anywhere in the world that will enable me to use the plotter to dump work produced by such programs as Print Shop or Newsroom?*

A. I am not aware of any general purpose driver to do what you want. It is most likely that some charting programs can be found that have drivers built in to produce bar graphs and the like on the plotter. The problem is that you have two incompatible methods of producing graphics. The screen is arranged as bit mapped graphics; it is composed of a matrix of dots that are either on or off. Your plotter on the other hand is designed to process a series of vector commands; move to a location, draw a line to another location, etc. Once the screen picture has been drawn, there is no way to convert that image into vector commands. The only way this can work is if the graphics generating program produces both the vector commands and the screen drawing commands.

It is possible to write a driver program to command the plotter to do the equivalent of a scan of the screen and reproduce the dot pattern on the plotter. Using this method turns your plotter into a jackhammer and produces a drawing resolution the same as the screen resolution. I don't think this is a very acceptable solution, especially since inexpensive dot matrix printers do it better and quicker.

Please rate this article on the Reader Service Card by circling:

120 Excellent **121** Good
122 Fair **123** Poor

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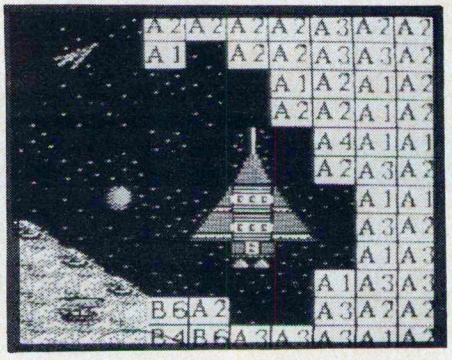
THE MARKETPLACE

The following items are selected by our editorial staff from the large number of product announcements and news releases sent to us daily. They are presented solely to keep you informed about the current market for Apple related hardware and software. As we have not tested many of these products, appearance here does not necessarily represent endorsement or recommendation by **A.P.P.L.E. Co-op.** Further information about items appearing in **The Marketplace** can be obtained through the Reader Service Card. If you contact any manufacturer directly, please mention that you learned about them in **Call -A.P.P.L.E.**

THREE AWARD WINNERS

Weekly Reader Family Software announces 3 award winners, StickyBear Town Builder, PicBuilder, and CarBuilder. StickyBear town builder builds and stores up to 20 towns from the ground up roads, parks, buildings. Then practice your map skills as you follow directions in your little purple car, reaching as many places as possible before running out of fuel. OOPS! you've lost your keys! Use the compass and direction clues to locate the mystery keys hidden in the towns.



PicBuilder constructs color pictures block by block-from castles in air to satellites in space! Use 40 build-by-number pictures stored on the disk to build up design skills, then go on to invent your own pictures! Save pictures and print them, or use PicBuilder with other graphic utilities to create outstanding designs!

CarBuilder designs constructs, refines, and tests cars that you build! Get first hand experience as you design chassis, engines, suspension systems-all the mechanics of car building. Use the wind tunnel and test track he aero dynamic, racing, and fuel capabilities of you car. No limit to the number of cars you can design and store to disk.

Price: $39.95. *Weekly Reader Family Software, 245 Long Hill Road, Middletown, CT 06457, (203) 638-2400*

CiIRCLE **33** ON READERS SERVICE CARD

A SIMULATED GARDEN

Botanical Gardens, a new simulation from Sunburst Communications, teaches students to control variables in scientific experiments and present results informatively and attractively. It boasts two "greenhouse gardens," as well as "graph rooms" for recording data from each of the "gardens," a "seed room" for selecting seeds, and a "library" to read up on available plants and to view pictures of them in full growth.

The program comes with four seeds for study: Gorp Flower, Donkey Breath, Sunny Fern, and Mountain Bell. However, experimentation is not limited to these. Botanical Gardens has its own "genetics Lab" where teachers and students can design seeds by selecting a name, writing a brief description of the seed, determining the plant parameters, and selecting the appearance of the plant.

Whether students are experimenting with the predetermined seeds or their own custom seeds, the tasks are the same: to use the problem-solving strategies of controlling variables, graphing data, and analyzing results. Students can adjust the settings for light, water, soil, and heat as they seek to discover those values which produce optimum growth.

Botanical Gardens lends itself particularly well to stimulating interest in and understanding of the scientific method. The importance of changing only one variable at a time becomes evident very quickly. The ability to make sense of the data collected is enhanced by the graph room. Also, the ease with which values can be changed in the program not only makes repeated testing easier but also demonstrates the necessity for sufficient testing in all experimentation.

Price: $59.00 *Sunburst Communications Inc., PleasantVille, NY, 10570, (914) 769-5030.* CIRCLE **34** ON READER SERVICE CARD

LOW COST HARD DISK DRIVES AND TAPE BACKUP

First Class Peripherals announces the compatibility of its two low-cost external hard disk drives and tape backup subsystem with the new Apple IIGS Called SIDER, the series is also compatible with the Apple II+ and Apple IIe. The series consists of the 10 megabyte Sider selling for only $499, the 20 megabyte Sider II selling for $799, and B-Sider 20 megabyte tape backup which sells for $695.

Included in the price of the Sider, is everything needed to install and operate the subsystem including: the Apple host adapter card, cable, terminator plug, all necessary software and a user's guide. The tape backup B-Sider includes a data cassette. Additional data cassettes are available upon request *First Class Peripherals, 3579 50 East, Carson City, NV, 89701, 1-(800) 538-1307.*

CIRCLE **35** ON READER SERVICE CARD

DEVELOPER DISK UPDATE

Nite Owl Productions announces the release of Developer Disk #1 and DAS Editor, and update for it's popular AppleSoft programming software packages. The programs and documentation for both of these packages have been significantly improved and combined into a single package, Developer disk #1, second edition, which is fully compatible with Apple IIe, IIc, and IIGS computers. This new product is ideal for novice and professional programmers who wish to create 'friendly' application programs for the entire apple II family of computers. Developers will be able to use Nite Owl's ProDOS enhancements with their own programs without additional licensing or royalty fees. The Developer Disk includes:

NORT

The Nite Owl Run Time, adds several new commands and enhancements to the ProDOS operating system. The most significant improvements is the Quick Index, and auto menu, program selector, capable of running programs, TYPING text files, and Quick Indexing subdirectories with a single keypress. It can handle up to 255 files in a single directory and is ideal for use with any size of ProDOS disk including large capacity hard disks.

DAS Editor

The AppleSoft Editor is a full screen scrolling AppleSoft program editor which functions better than a word processor for creating, editing, and debugging AppleSoft programs. It includes Search & Replace, RENUMBER, MERGE, two Glossaries, use of default file names, and many single key commands which make Applesoft programming easy.

GETSTRING

Provides commands for the entering and editing of AppleSoft string variables similar to a word processor. This can add a professional touch to almost any AppleSoft program as the arrow keys and 'delete' key will function as they should.

PACKER

Condenses standard hi-res graphic displays into files which

require only half as much disk storage space. Both 40 and 80 column text displays can also be packed into small BRUNable files. Pack pictures and text displays are stored as relocatable binary files which interface with the Quick Index.

Screen Editor

Is a superb utility for the creation and editing of 40 and 80 column text displays. Standard text as well as mouse text characters can be used to make unique title pages, help screens, input screens, and displays for use by demonstration programs.

SetDate

Allows the computerist to easily set the ProDOS date register for proper dating of disk files on systems which do not have a clock.

Killer

Adds a KILL command to the ProDOS operating system for use by frustrated programmers who wish to keep their computers in-line and cannot afford to use a large hammer.

In addition to the major programs, this double sided disk includes several demonstration programs, and on screen help files. The flip side of the disk contains an Introduction to ProDos and Applesoft which describes how to use each of the commands and also demonstrates the power and flexibility of NORT for organinzing ProDos disks. The product includes a comprehensive instruction manual and quick reference card. Price: $39.95 *Nite Owl Productions, 5734 Lamar, Mission,KS k66202, Bob Shofstall, (913) 362-9898.*

CIRCLE **36** ON READER SERVICE CARD

WRITING TERM PAPERS

Personal Choice Software announces the release of Term Paper Writer, a multi-purpose software program for writing and formatting school term papers. Term Paper Writer is actually four software programs in one, including the Notetaker, the Outliner, The Writer and The Footnoter and Bibliography Compiler. While these tools are generally available as four separate pieces of software from other manufactures, Term Paper Writer offers them in combination as a cost effective, fast, efficient way to gather and compile information. Printed documents as long as 20 pages can be easily produced and formatted to fit the user's individual needs. The Notetaker, an electronic card file, allows you to collect information by source and by topic. These notes can be quickly accessed for reading, editing or deleting. They may even be printed or transferred directly to your master document. The Outliner then allows you to organize lists of ideas into topical groups or a formal outline. The Writer is a full-featured word processor containing many editing functions from margin setting, line spacing and page breaks to style techniques such as boldface, underlining and centering. A few words or an entire block of text may be edited or replaced instantly, and a word count is constantly maintained throughout the development of the document. The final step, the Footnoter and Bibliography Compiler, will insert footnotes on appropriate pages and compile information for the bibliography directly from the Notetaker

Price: $59.95 . *Personal Choice PO Box 7286 Mountain View CA 94043 (415) 960-0410.*

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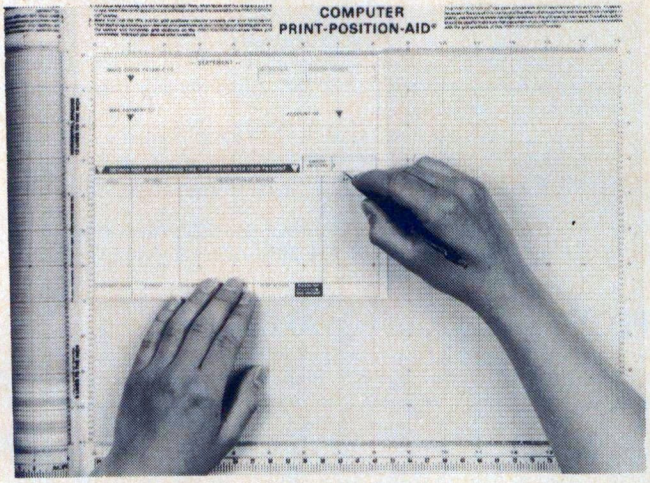
THE PRINT POSITION AID



The Print Position Aid is a useful tool for: Programming, Word-Processing, Designing Business Forms , Proof Reading, Locating Output Print Positions and it consists of six transparent 11 x 15 inch grid overlays which help in determing the correct print positions for output. The templates accommodate the printing needs of 10-12-15 characters per horizontal inch with 6 or 8 lines to the vertical inch. Pica spacing is also provided. Features include:

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Price: $49.95. *Computing Aids Inc., PO Box 227, Needham, MA, 02192, USA (617)444-3833.* CIRCLE **38** READER SERVICE CARD

SPECTROSCOPY SOFTWARE

Interactive Microwave announces SPECTROCHART software, which simplifies and automates all types of spectroscopy, including UV/Visible, IR, Fluorescence, Reflectance, AA, etc. Using a 128K Apple IIe computer and IMI's ADALAB data acquistion board, SPECTROCHART records and analyzes voltage signals from the recorder output of any spectrometer. A special version is available to fully control a Milton Roy spectronic 1001 spectrometer via its RS232 interface.

A method file specifies all options of data acquistion and anaslysis. Up to 100 standards and unknown samples can be analyzed automatically in any sequence. For each sample, Spectrochart records a single absorbance transmittance, or concentration value, or multiple timed values for kinetic studies. Also, a spectrum can be recorded as the instrument scans. A scrolling stripchart on the screen or printer, documents the results both graphically and numerically.

Power graphics routines can plot multiple samples, kinetic curves or spectra in windows of any size up to 560 by 192 pixels. The position, size, background color, X and Y scales, and labels on each graph are fully adjustable. Any value can be displayed instantly by moving the cursor along the plotted curve.

Post-run analyses include conversions from transmittance to absorbance measurements of peak, heights, peak areas, peak and valley positions, and rates of change. Calculations can be performed on single samples or entire data sets, including add, subtract, multiply, divide, differentiate, integrate, normalize, moving average, smooth and first through fourth derivatives calculated by Savitzky-Golay convolution. A "learning" mode allows the analysis program to record a procedure of up to 50 steps and repeat this procedure automatically for future runs.

A standard curve can be constructed by least squares curve fitting on up to 25 standards and duplicates, using a first, second, third, or fourth-order polynomial. Based on the standard curve, the amount or concentration is calculated for up to 97 unknown samples, corrected for dilution. The final report includes statistical measures of the accuracy of the fitted curve, as well as the results for each standard and unknown sample.

SPECTROCHART is available immediately for $495; the Spectronic 1001 version is $695. Complete Spectroscopy workstations begin at $2715, including the Apple IIe computer, all required peripherals, and software. *Interactive Microware, Inc.,P.O Box 139, State College, PA , 16804-0139* ((212) 238-8294.

CIRCLE **39** ON READER SERVICE CARD

11 PIECE COMPUTER TOOL KIT

Curtis Manufacturing Company, Inc., has Introduced its newest computer accessory product, an 11-piece Computer Tool Kit. The kit, is packaged in a compact zippered vinyl case and contains 11 demagnetized tools ideal for installing disk drives and expansion boards and of making minor computer repairs. This Kit allows ussers to be self-sufficient and reduce computer down-time and aggravating service calls.

The Kit features a unique patented chip inserter. It also includes: two Phillips screwdrivers; two slotted screwdriver; two nut drivers; on TORX screwdriver one 3-claw parts holder; one chip inserter with pin straightener and one chip extractor. All tools are demagnetized to protect computer hardware and software from damage

Price: $29.95. *CURTIS MANUFACTURING CO. INC.,305 Union Street, Peter borough, NH, 03458, (603) 924--3823 Telex 324-238.*

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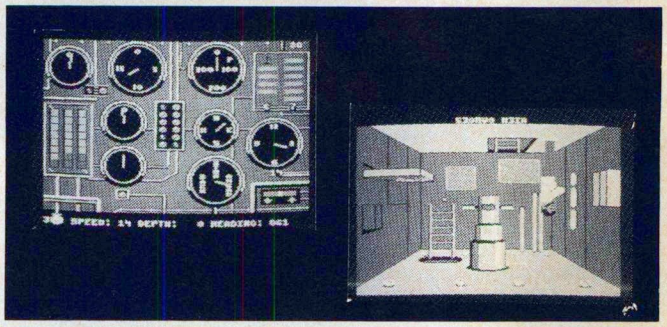
IIGS SECTION

SUBMARINE SIMULATION



MicroProse Software, Inc. announces the release SILENT SERVICE. Silent Service is the most detailed and realistic submarine simulation available for personal computers. The thrill and danger of captaining a World War II submarine in the South Pacific can be experienced through a wide selection of historical scenarios ranging from single-ship attacks to multi-patrol missions with heavily escorted convoys. All of a submarine's critical battle stations are replicated: the connng tower, engine room and ship's bridge. Player selected "reality levels" provide challenge and complexity. Automatic time scaling insures that actions and decisions are constantly required. The Apple IIGS version was designed to take special advantage of the IIGS' remarkable graphics, sound and speed for exciting play-action. The version features a detailed map system and enemy targets, intricately designed instrumentation and submarine interior, and an expanded enemy fleet. The sound effects of the sea, engine, and submarine klaxon are realistic. Game controls have been simplified to employ on-screen icons for all activity selections so that the submarine can be controlled entirely with a mouse. Silent Service for the IIGS requires 256K minimum memory and one 3.5-inch disk drive. A color monitor and mouse are recommended although the program can be fully keyboard controlled. Price: $39.95. *MicroProse 120 Lakefront Drive, Hunt Valley, Maryland 21030 (301)667-1151.*

CIRCLE **41** ON READER SERVICE CARD

A TIME FOR KIDS

KidsTime II is an educational package for young children for use with the new Apple IIgs computer. KidsTime II contains two educational programs which are suitable for young children ages 3 to 10 years old. Children as young as 2 can enjoy using both programs, and older children can also enjoy KidNotes, were derived from the popular and successful Macintosh KidsTime programs. They are excellent demonstrations of the high quality sound and graphics available on exploration, and skill development.

ABKey is a letter recognition/keyboard skill program which contains many levels of difficulty and challenge. The simplest level involves identifying an uppercase letter on the computer screen and pressing the corresponding key on the keyboard. A more difficult level involves identifying a lowercase letter. The more challenging levels of challenge utilize pictures for letter identification. As a colorful picture is presented on the screen, the child pressses the letter which starts the word for the picture. There are two different full color pictures for each letter. All the difficulty levels of ABKey may also be played at different speeds. The speed levels are 1 at a Time, 2 at a Time, Slow, Medium, and Fast.

KidNotes is an introductory music program that allows children to explore many aspects of music. An assortment of simple melodies familiar to young children, including some nursery rhymes, is included on the disk. These songs, along with any new creations, may be played using the synthysizer chip built into the Apple IIGS. Children can experiment with rhythmn, pitch, duration, tempo, volume, simple time signatures, and simple key signatures. Melodies can be

entered using the mouse or the computer keyboard. An on-screen piano keyboard can be "played" using the mouse to create new melodies. As the notes are entered, they are highlighted on the screen piano keyboard and the note is heard. When the melodies are played back, the notes are highlighted on the screen piano keyboard and on the musical score. All music which is entered may be saved, played, and edited. Editing is done using the mouse to highlight the note or selection of notes which need to be changed. The notes which are selected may be deleted using Backspace or replaced by entering new notes. Childeren of all ages will enjoy using this introductory music program. Price: $39.95 *Great Wave Software,104 Gilbert Ave., Menio Park, CA, 94025,(415)325-2202.*

CIRCLE **42** ON READER SERVICE CARD

IIGS ENHANCEMENTS

Memory Expansion and Video Digitizer

AST Research Inc. has expanded its commitment to the Apple personal computer market with the introduction of two hardware products, a graphics video digitizer and a memory-expansion card, for Apple IIGS. In addition to the two new products, AST announced that the AST-2000, a 3.5-inch hard disk and tape SCSI subsystem, and the one-megabyte SprintDisk memory card are now compatible with the new apple IIGS. AST's new video digitizer, designated Ast-Vision-Plus, complements the super high-resolution graphic capabilities of the Apple IIGS by providing color and black-and-white image processing. AST-VisionPlus' unique software includes special-effect features such as zoom-in, aspect ratio control, contrast and color, gray level compression, inverse video and color assignment to gray levels. To further enhance the built-in features of Apple's new computer, AST will offer the new RamStakPlus memory-expansion card designed specifically for the Apple IIGS. The one-megabyte memory-expansion card is designed to reside in the computer's special extended memory slot and will take advantage of the Apple IIGS' built-in RAMdisk feature.

AST-VisionPlus Price:$295—RamStakPlus Price: $129 *AST Research, Inc., 2121 Alton Avenue, Irvinee, CA 92714 (714)863-1333.*

CIRCLE **43**ON READER SERVICE CARD

The ProGrappler

Orange Micro announces two new products, the ProGrappler intelligent parallel printer interface and the Rampak 4GS memory sub-system. The firm announced that its popular Grappler+ parallel printer interface will be discontinued and replaced with the new ProGrappler. Although the new product is designed to be used with the Apple IIe and IIGS it provides special support for the IIGS user.

The ProGrappler will keep Grappler+ compatibility, but will incorporate several new features. It provides all the hardware necessary to connect most popular printers to the Apple II Plus, IIe or IIGS and provides many options for printig text or graphics directly from the Apple's screen. This is accomplished on the enhanced IIe and IIGS through new pull-down menus, allowing easy visual selection of any ProGrappler or printer features. These options include inverted and rotated graphics, graphics windowing, enlargement, and printing of any hi-resolution Apple graphic, including the IIGS's new super-hi-resolution screens. All features can also be accessed through the traditional "CTRL--1" commands or now through easier-to-understand "+" commands, where options are expressed with plain English words.

Special for users of the Apple IIGS, ProGrappler functions can be accessed through the Desk Accessory menu in the IIGS operating system. The Desk Accessory menu is accessable through many existing applications, and will be fully enabled on most software written for the IIGS. In this way, the user can print virtually anything displayed on the screen, providing a "screen'shot" without resetting the Apple or restarting software. On earlier Apples this was only possible through the use of external swithches.

The ProGrappler is compatible with most popular printers, including Epson, Okidata, Toshiba, ProWriter, Panasonic, Citizen, Star Micronics and many more. Price: $119.00 *Orange Mi-cro, 1400 N. Lakeview Ave., Anaheim, CA 92807 ,(714)779-2772*

CIRCLE **44** ON READER SERVICE CARD

The RamPak 4GS

Orange Micro's advanced entry into the memory expansion market is called the RamPak 4GS memory sub-system for the Apple IIGS. It provides a standard 512K of memory, expandable by the user to 4 megabytes, and includes a powerful memory management utilities package for RAM catching, diagnostics and for the first time, dynamic allocation of memory.

The RamPak 4GS uses 256K x 4 RAM chips, enabling the user to expand in 2 chip (or 256K) increments, as opposed to the 8 chip minumum required by other formats. Memory automatically self-configures, so no switch settings or jumpers need be changed. And the RAM diagnostics utility will detect and pinpoint any RAM problems that may arise, before they cause data loss or damage.

The RamPak 4GS provides powerful memory management to maximize system efficiency and significantly increase performance. RAM caching stores often-used programs or routines in main memory, eliminating the usual waiting time for disk access and loading. statistics may be recorded on the cache's efficiency, enabling the user to review and optimize the cache. The RamPak utilities also recognize Apple RAM disk provided with the Ilgs system, and work perfectly with it.
The optimize simultaneous use of several caches, the RamPak 4GS also provides Dynamic Cache Allocation. This unique feature actually manages your RAM caches, assigning the appropriate amount of RAM to each for the task in progress. The RamPak 4GS's Memory Management Utilities will access both the RamPak's memory and that resident on the IIGS motherboard. Price: $259.00 *Orange Micro, 1400 N. Lakeview Ave., Anaheim, CA 92807, (714)779-2772*

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CIRCLE **11** ON READER SERVICE CARD

DRAWING TABLE

Broderbund Software,Inc. announces Drawing Table, a high resolution object-oriented drawing program for users seeking an easy to use, full featured drawing and basic drafting tool. Drawing Table brings high resolution drawing to the IIGS. With resolution up to a 240th of an inch, 640 x 200 graphics, color design and printing, 20 line widths, zooming, and a host of other innovative precision features, the Drawing Table gives the IIGS buyer the ability to won a sophisticated drawing program with a combination of precision features not available on any other personal computer.

- Key Features and Benefits:
- Supports IIGs features: mouse, super high resolution colors, pull down menus.
- Easy to learn and use.
- Color design and printing in the IIGS" highest screen reso lution (640 x 200)
- Super precision features: 20 line widths, accuracy to a 240th of an inch, 3 choices of line width overlapping, line patterns and more...
- Multiple page editing: create and edit drawings ov more than one page at a time.
- Zooming: Superior precision while zooming from multiplepage drawings to extreme closeups.
- Multiple windows: open up to four drawings in separate windows and drag objects from one window to another with all colors and attributes intact.
  Multiple fonts, print effects, and sizing: Create professional
- Create drawings to use with Broderbund's Newsmakerr the IIGS.
- Use every available font and font size: no limitation your choice of fonts.
- Support LaserWriter and Image Writer II printers.

Price: $89.95 . *Broderbund Software 17 Paul Drive, San Rafael, CA 94903-2101 elephone: (415)479-1700.*

CIRCLE **46** READER SERVICE CARD

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VIP professional not only has the same commands and features as Lotus 1-2-3, you can also type the same key to do the same things. Lotus files can be read and written, and all functions can be used, including the powerful macros.

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Professional packs a tremendous ability to address up to four megabytes of data. It has 50-plus built-in financial and mathematical functions; A database with up to 8,192 records, each with up to 256 fields; or its five different types of graphs with tens of options; also lets you automate your spreadsheet for specific tasks such as classroom exercise, experimemts, or business applications such as accounting With Professional you get varied column width, split screens, frozen titles, sorting, data query, file combine and extract, copy, move, range naming, justification for doing word processing, statistical analysis, a full range of numerial formatting, engineering graphics precision, local and global protection of cells, header and footer control. Professional matches the power of any spreadsheet for any computer. Price: $249.95 *ISD MARKETING INC. 20 Steelcase Road West, Unit #12, Markham,Ontario, Canada L3R 1B2 (416) 479-1880.*

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Advertiser Index

Reader Service No.		Page No.
1	APDA	10
2,3,4	Applied Engineering	2,3,65,68
5	Beagle Bros.	20,21
6	Blankenship Associates	48
7	Cauzin Systems	67
8	Central Point Software	59
	CH Products	7
9	CopperSoft Solutions	57
10	Micro Systems Research	17
11	MGR Software	61
12	Precision Data Products	66
13-28	Protecto/Computer Direct	27-42
	Southern California ResearchGroup	51
29	Third Wave Technology	15
30	VF Associates	25

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1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150

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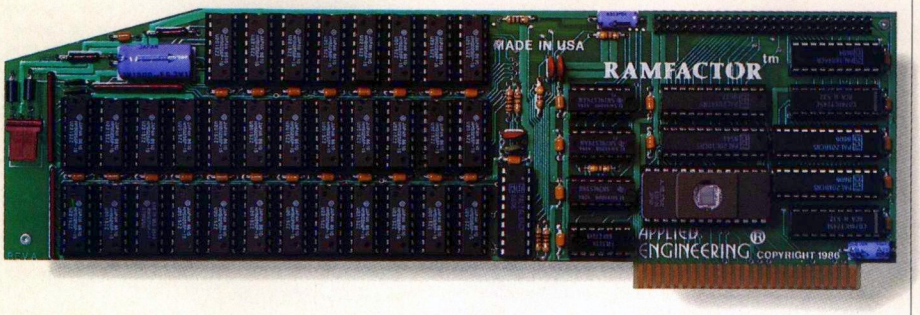

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SCIENCE EDUCATION SOFTWARE—Particles of Matter: Solids. Software and print-based Learning Module for Junior High Science Curriculum. Module uses a Learning Cycle approach to integrate discovery-based laboratory work with Interactive Tutorials. Teacher designed and tested. Apple II compatible. $35. Write for brochure. FULCRUM SOFTWARE, MS 20 8945 SW 177 Terrace, Miami, FL 33157.

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JANUARY CASE HISTORY

A comprehensive new book covering Turbo Pascal programming includes 15 pages of SOFTSTRIP data strips, enabling readers to input extensive programs using the SOFTSTRIP SYSTEM READER.

Jeff Duntemann, author of "Turbo Pascal, Second Edition — Revised and Enlarged" convinced publishers Scott, Foresman & Co., to include the data strips as a service to readers.

Some programs included in the book are lengthy — up to 800 lines. All 300K of listings are incorporated in the SOFTSTRIP data strips for easy entry with the Reader. An index indicates which files are contained in each strip.

Duntemann said inclusion of the data strips will let readers spend more time learning the intricacies of working with Turbo Pascal and significantly less time typing in the various programs.

This data strip contains IBM2MAC, a utility that runs on the IBM and converts an IBM file to Macintosh format.

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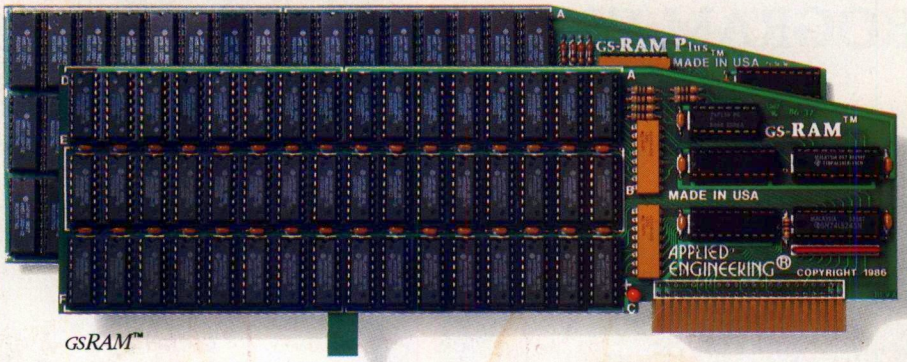

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Remember the 16K cards for the II+ and the 64K cards for the IIe? At the time, that much memory seemed like a lot. But when the owners of these memory cards came to us for more memory, many had to throw away their smaller Apple memory cards or try to sell them. Most of our customers told us that had they known about Applied Engineering's larger memory cards when they bought their Apple, they would have purchased them at the same time.

GSRAM and GSRAM Plus are available now, allowing up to 8 MEG of memory expansion. That's 8 times the memory capacity of Apple's card and just look at the benefits that only GSRAM and GSRAM Plus have over Apple's card:

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- Has ROM expansion port
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Simply plug GSRAM into the IIGS memory expansion slot and you've got up to *8 megabytes* of RAM at your fingertips—all of it instantly and automatically recognized by the IIGS. GSRAM is compatible with all IIGS software, including AppleWorks, as well as BASIC®, ProDos, DOS 3.3, PASCAL®, "C" and CP/M®.

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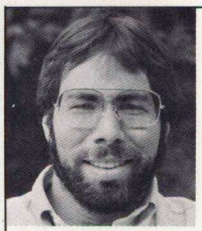
We offer GSRAM in two configurations so you can increase your memory 256K at a time (GSRAM) or a megabyte at a time (GSRAM Plus). Both offer full compatibility, lower cost than other boards, and easy expandability. And both are extremely low in power consumption. A fully expanded GSRAM operates at only 375 ma, and GSRAM Plus at only 270 ma (even with 6 megabytes on board!)

GSRAM—for Normal Memory Requirements

GSRAM is available with 256K, 512K, 1 MEG or 1.5 MEG of memory already on board. If you don't need the full 1.5 MEG now, you can choose a GSRAM with less memory and expand it up to 1.5 MEG in the future—or upgrade to GSRAM Plus for a small charge.



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With an optional piggyback card, you can expand GSRAM even higher than 1.5 MEG! (Other cards are only expandable to 1 MEG.)

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GSRAM Plus is the first Apple memory card to use 1 MEG RAM chips on the main board. It's available with 1 to 6 MEG on board. If you don't need the whole 6 MEG now, you can buy a GSRAM Plus with less memory and easily expand it in the future.

GSRAM Plus can be expanded up to 8 MEG with an optional piggyback card.

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